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Contents

Les Pedley (1930–2018)

Mostly about wattles: the publications of Les Pedley
P.I. Forster 291–296

Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 6.
L. Pedley. 297–320

A taxonomic revision of Sapotaceae for mainland Australia
L.W. Jessup 321–382

Charles James Wild (1853–1923), an ardent collector of Queensland bryophytes
A.J. Franks 383–404

A taxonomic revision of *Lagenophora* Cass. (Asteraceae) in Australia
J. Wang & A.R. Bean 405–442

Brachychiton guymeri J.A.Bever., Fensham & P.I.Forst. (Sterculiaceae), a new species from north Queensland
R.J. Fensham, J.A. Beveridge & P.I. Forster 443–457

Three new species of *Corchorus* L. and *Grewia* L. (Sparmanniaceae / Malvaceae subfamily Grewioideae) from northern Australia, an earlier name in *Grewia*, and recircumscription of *Triumfetta kenneallyi* Halford
R.L. Barrett 458–472

Reinstatement of *Ptilotus parviflorus* (Lindl.) F.Muell. (Amaranthaceae)
A.R. Bean 473–479

A re-evaluation of the taxonomic status of the Australian species of *Arthraxon* Beauv. and *Thelepogon* Roth (Poaceae: *Panicoideae*: *Andropogoneae*)
E.J. Thompson. 480–505

The botanical collections of William Hann's Northern Expedition of 1872 to Cape York Peninsula, Queensland
J.L. Dowe & P.I. Taylor. 506–538

Rediscovery of the previously Extinct *Marsdenia araujacea* F.Muell. (Apocynaceae)
P.I. Forster 539–540

Dendrocnide cordata (Warb. ex H.J.P.Winkl.) Chew (Urticaceae) is not present in Australia
A.R. Bean 541–544

Alangium solomonense (Bloemb.) W.J.de Wilde & Duyfjes (Cornaceae), a new species record for Australia and Queensland
P.I. Forster 545–547

Les Pedley at Sweers Island, Gulf of Carpentaria, November 2002. Photo: M.B. Thomas

Les Pedley (1930–2018)

Les Pedley passed away on 27 November 2018 at his Indooroopilly home in Queensland. He was born in Ipswich, Queensland on May 19, 1930 and attended Ipswich Grammar School. On finishing school in 1948 he became a cadet in the Department of Agriculture and Stock in Brisbane. After a 5-year cadetship, during which time he gained a Bachelor of Science from the University of Queensland, he was appointed as Assistant Botanist in 1953 at the then Botany Branch and Herbarium located in George Street, Brisbane. In the 1960s Les was seconded to CSIRO to work on two Queensland Land Use surveys: Nogoa – Belyando in 1964 to 1965 and Maranoa – Balonne in 1968 to 1969. In 1968 he carried out a survey of the vegetation of Cape York Peninsula with Ray Isbell from CSIRO. From these surveys Les developed a love and appreciation for Queensland's open country and the plants and birds that inhabited these landscapes.

Les was the Australian Botanical Liaison Officer at The Herbarium, Royal Botanic Gardens, Kew, from 1971 to 1972. He returned to work at Kew in 1992 and while there he wrote accounts of legumes for the *Revised Handbook of the Flora of Ceylon*. Most of Les's working life at the Queensland Herbarium involved a range of administrative duties as well as his taxonomic research into Australian legumes: in particular the genus *Acacia*. Les formally described over 160 plant species new to science, most of these from Queensland.

Les studied Latin and French at high school and in the later part of the 1970s he returned to the University of Queensland to pursue an Arts degree including further Latin studies. This he successfully completed in 1980. Les's Latin skills, plant nomenclature and taxonomic knowledge were always greatly appreciated by his colleagues and friends at the Queensland Herbarium. Indeed, this issue of the Queensland Herbarium's scientific journal *Austrobaileya* contains 10 'old school' Latin diagnoses written by Les as part of the formal publication of 10 new species of wattle.

Les was the founding Editor of *Austrobaileya* in 1977 and performed this role to 1988 when he officially retired as Assistant Director. He was also a member of the Editorial Committee of the *Flora of Australia* from 1980 to 1988. After retirement Les enthusiastically continued to pursue his taxonomic studies as a Research Associate at the Queensland Herbarium. He worked 5 days a week, eventually dropping back to 4 days, for the next 30 years and published more scientific papers in 'retirement' than he did while employed. In 2008 Les was awarded an Australia Day Achievement Award from the Department in recognition of his outstanding contribution to Queensland botany.

Les was a keen field botanist and conducted extensive field work throughout Queensland. He collected legume specimens into his 80s with his daughter as the driver. He contributed over 4000 specimens to the Queensland Herbarium collections.

Les was a very kind and generous man, and great colleague. He loved to tell stories of the early days in his career, his many field experiences and his observations of life and people. We will miss his friendship and expertise.

This issue of *Austrobaileya* is dedicated with due respect to the memory of Les.

A full bibliography is appended.

Les is honoured by the legume genus *Pedleya* H.Ohashi & K.Ohashi and five native plant species: *Acacia pedleyi* Tindale & Kodela, *Commersonia pedleyi* Guymer, *Diploglottis pedleyi* S.T.Reynolds, *Ptilotus pedleyanus* Benl and *Tephrosia pedleyi* R.Butcher.

G.P. Guymer, Queensland Herbarium

Mostly about wattles: the publications of Les Pedley

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Les Pedley published approximately 90 scientific papers, flora accounts and extension articles over a 57 year period (1962–2019), with about half published after he retired from paid work at the Queensland Herbarium in 1988. Over half (48 publications) are about various aspects of wattles (*Acacia* Mill. *s.l.*: variously as *Acacia*, *Racosperma* C.Mart., *Senegalia* Raf. or *Vachellia* Wight & Arn.), the remainder being on diverse legume groups (25 publications) or other plant families such as Agavaceae, Asteraceae, Caryophyllaceae, Combretaceae, Ericaceae, Myrtaceae, Pandanaceae, Polygalaceae and Rutaceae. Whilst the majority pertain to Australian groups and species, there are publications that have impacted outside of Australia such as the paper on the recognition of *Racosperma* (Pedley 1986) and accounts of diverse legume genera in *A Revised Handbook to the Flora of Ceylon* and *Flora of China*.

Early in his career at the Queensland Herbarium Les was seconded to the CSIRO on their land survey program and three critical publications on vegetation resulted from this that have remained pertinent for decades afterwards (Gunn *et al*. 1967; Pedley & Isbell 1971; Galloway *et al*. 1974). Otherwise his publications are largely taxonomic accounts of families, genera and species. There is a large number (*c*. 160) of new taxa (mainly as species, but with also subgenera, series, subspecies and varieties) described, starting in 1964 and continuing to 2019. These were mainly in *Acacia* (or as *Racosperma*), but also in a diverse assemblage of genera from multiple families (*Aphyllodium* (DC.) Gagnep., *Atylosia* Wight & Arn., *Caesalpinia* L., *Comesperma* Labill., *Dendrolobium* (Wight & Arn.) Benth., *Desmodium* Desv., *Leucopogon* R.Br., *Polycarpaea* Lam., *Sigesbeckia* L., *Terminalia* L. and *Tetramolopium* Nees). A large number of new combinations were also made, mainly pertaining to *Acacia* or *Racosperma*, but also in genera such as *Paraderris* (Miq.) R.Geesink.

Les contributed to a number of flora series, including *Flora of Australia*, *Flora of South-eastern Queensland*, *A Revised Handbook to the Flora of Ceylon* and *The Flora of China*; however, did not contribute introductory text to the large multivolume *Flora of Australia* volumes on *Acacia s.l.* that were published in 2001 during the extended debate on *Acacia* and *Racosperma*. Nevertheless, it is fair to say that a considerable portion of the overall framework for groups in those two volumes owed much to the synthesis on *Acacia* that appeared in the 1986 paper, as well as the landmark account of Queensland Acacias in 1978 and 1979. Despite this, he did contribute a large number of individual species accounts to the two volumes on *Acacia*.

Apart from the formal scientific work published in journals and book series, Les also published a small number of articles that can be categorised as extension (on name usage, brigalow control, or native plant cultivation) and others that were more as commentary on the general debate concerning *Acacia* and *Racosperma*. More whimsical pieces appeared on what camels eat, and on abominable epithets coined by some authors for Queensland species.

Les mainly published as a sole author; although he did co-publish with other colleagues at the Queensland Herbarium (Forster, Reynolds), other co-workers on

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Acacia s.l. (Maslin) and diverse legumes from China (Chen, Zhang & Wei), as well as his land system or agricultural research colleagues from the then Queensland Department of Primary Industries and the CSIRO.

With biological taxonomists, the best appraisal of their work is whether the classifications and taxa they propose continue to be recognised into the future. The overwhelming majority of the taxa proposed by Les are still currently recognised; in some cases where they have been reduced to synonymy this was done by himself. Even though the proposal to recognise *Racosperma*, for mainly the species of wattle that occur in Australia, ended up being averted via a highly disputed process (Smith *et al.* 2006), the major groupings of wattles as defined by him are largely supported by more recent studies based on molecular data and analyses (Murphy 2008).

The legumes in particular are an important group of plants in terms of their ecological abundance, often with particular species defining the vegetation communities that they occur in. In this respect, Les was pivotal in coming to terms with the diversity of wattles in a large part of Australia and elsewhere. Species from the mulga complex are widespread over much of inland arid to semi-arid Australia and were of particular interest. While it is a highly variable species complex he did much to resolve this variation into taxonomic entities, naming some widespread species (e.g. *Acacia tephrina* Pedley) considered to possess considerable potential significance in terms of their timber (Lake 2019).

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Pedley, L. (2019). Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 6. *Austrobaileya* 10(3): 297–320.

Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 6.

Les Pedley†

Summary

Pedley, L. (2019). Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 6. ***Austrobaileya* 10(3): 297–320.** *Acacia ammitia* Pedley, *A. anadenia* Pedley, *A. castorum* Pedley, *A. dichromotricha* Pedley, *A. forsteri* Pedley, *A. hierochoensis* Pedley, *A. lithgowiae* Pedley, *A. parvifoliolata* Pedley, *A. philoxera* Pedley and *A. pudica* Pedley are described as new species. All ten species are endemic to Queensland and have restricted distributions. The new species are illustrated with line drawings or photographs and notes are provided on their distribution, habitat and putative affinities.

Key Words: Leguminosae; *Mimosoideae*; *Acacia*; *Acacia ammitia*; *Acacia anadenia*; *Acacia castorum*; *Acacia dichromotricha*; *Acacia forsteri*; *Acacia hierochoensis*; *Acacia lithgowiae*; *Acacia parvifoliolata*; *Acacia philoxera; Acacia pudica*; Australia flora; Queensland flora; new species

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Introduction

Acacia Mill. is the most speciose flowering plant genus in both Australia and Queensland with about 950 and 300 species currently recognised respectively. A significant number of undescribed species of *Acacia* from Queensland remain to be formally studied and assessed to determine their taxonomic status (Holland & Pedley 1997; Pedley 2002, 2007, 2010, 2017). Since the account of Pedley (1978), a number of new species have been described (Pedley 2006) and in this the final paper in the series (Pedley 1964a, 1964b, 1969, 1974, 2006), a further ten species are proposed. These are from diverse groups within the genus and for consistency are referred to the previously recognised sections (Pedley 1978). A modified version of this sectional classification was used in the *Flora of Australia* account of *Acacia.*

Materials and methods

The species described in this paper are based on dried collections at the Queensland Herbarium (BRI). Descriptions follow previous format and style (e.g. Pedley 2006). Common abbreviations in the specimen citations include Mt (mountain), NP (National Park) and SF (State Forest).

Editorial notes: This manuscript has been supplemented with additional descriptive material and specimen citations. Distribution and habitat information for *Acacia dichromotricha* and *A. philoxera* were largely supplied by Jenny Silcock.

Taxonomy

Phyllodes uninerved; heads not in racemes [*Acacia* sect. *Phyllodineae*].

Acacia castorum Pedley **sp. nov.** affinis *A. confertae* A.Cunn. ex Benth. a qua phyllodiis latioribus, minus elongatis et plerumque obtusis, leguminibus angustioribus, seminibus parvioribus differt. **Typus:** Queensland. Leichhardt District: Mt Castor, Gemini Mountain section of Peak Downs National Park, 15 January 2001, *R. Fairfax & D. Butler 405* (holo: BRI).

Acacia sp. (D.W.Butler 98); Butler & Fensham (2008: 524).

Shrub to 3 m tall. Branchlets with moderately dense crisped hairs; stipules narrowly triangular, 0.4–0.5 mm long, *c.* 0.1 mm wide, persistent. Phyllodes borne on short projections of stem, irregularly obliquely

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whorled, narrowly obovate, unequally obtuse, minutely obliquely apiculate, 5–9 mm long, 1.5–2.4 mm wide, 2.5–5 times longer than wide, glabrous or with scattered adpressed hairs (*c.* 0.4 mm long) when young, thick, midrib obscure, nearer the upper margin; gland small, 1–2 mm from base; pulvinus 0.5–0.6 mm long. Flowers in globose heads of *c.* 25 flowers; peduncles single in the axils, 10–12 mm long, glabrous and slightly pruinose when young. Flowers 5-merous, seen only when very young. Pods to *c.* 30 mm long and 8 mm wide, with up to 8 seeds; valves coriaceous, pruinose, without obvious veins. Seeds longitudinal, 4.3–5 × 3–3.3 mm, shiny black; areole large, central; pleurogram closed; funicle thickened and folded forming clavate aril. **Fig. 1.**

***Additional specimen examined*: Queensland.** Leichhardt District: Gemini Peaks NP, SW side of small peak SW of Mt Pollux, Mar 2005, *Butler 98* (BRI).

***Distribution and habitat*:** *Acacia castorum* is known only from the twin peaks of Mt Castor and Mt Pollux in the Gemini Peaks National Park in the Peak Range, northeast of Clermont in central Queensland. It is recorded from cliff-lines and steep slopes on trachyte within an open woodland of *Eucalyptus crebra* F.Muell. and *Corymbia trachyphloia* (F.Muell.) K.D.Hill & L.A.S.Johnson subsp. *trachyphloia*, shrubs such as *Bertya pedicellata* F.Muell. and with *Triodia mitchellii* Benth. dominant in the understorey.

***Notes*:** *Acacia castorum* is closely related to *A. conferta* but has denser indumentum on the stems, wider, less elongate, usually obtuse phyllodes and narrower pods with fewer smaller seeds. Interestingly, *A. conferta* is also present at Mt Castor (*viz. Butler 148 & McGee*, BRI), although the two species are allopatric with *A. castorum* on the exposed cliff-lines whereas *A. conferta* is on scree at the base.

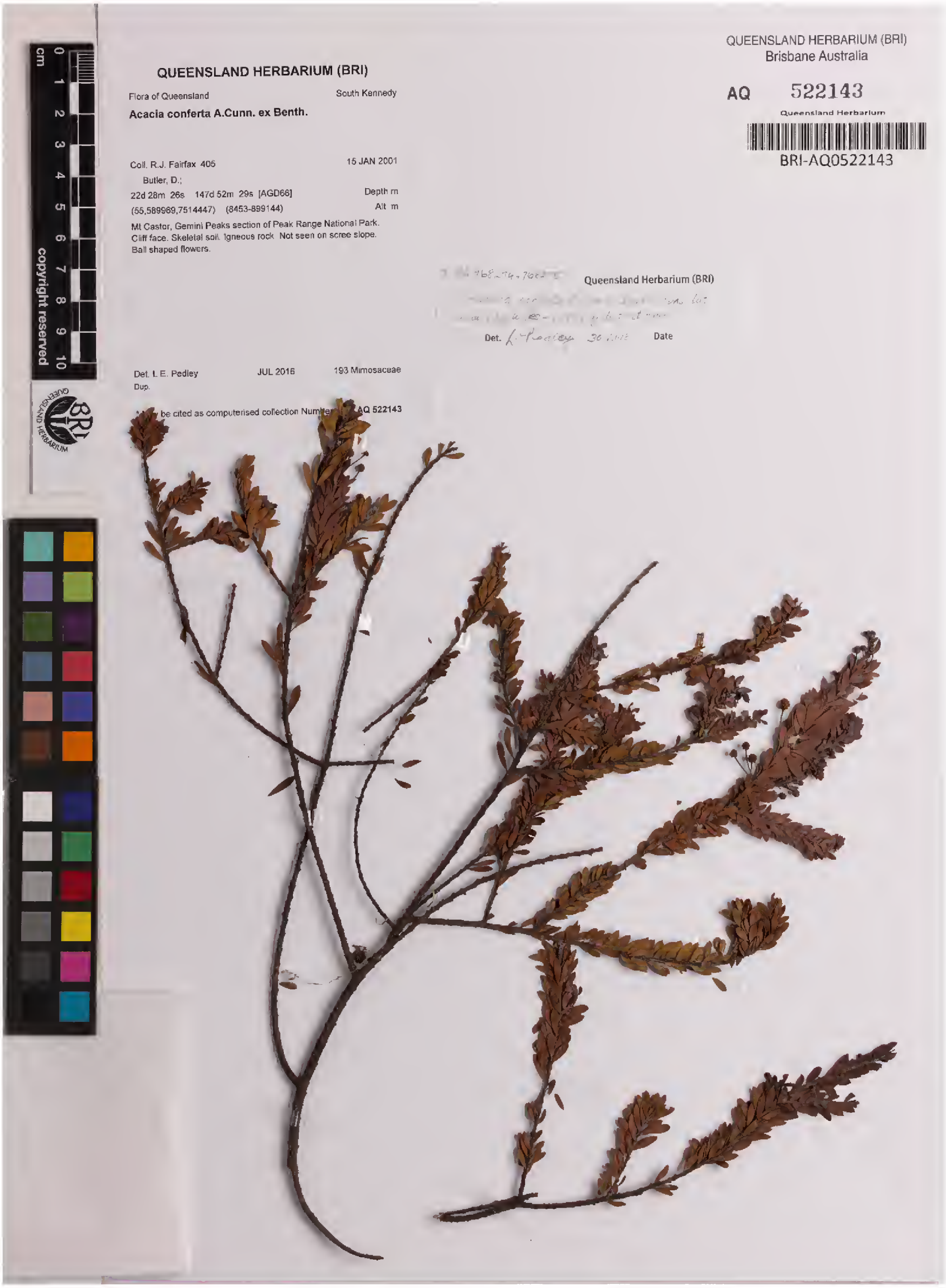
***Etymology*:** The specific epithet *castorum* is the plural genitive of the Latin noun *castor* and is a noun in apposition. It is alludes to being “of the Castor twins” or the mountains named after them. The half twins Castor and Pollux of Greek and Roman mythology are referred to in Latin as the *Gemini* or *Castores*.

Acacia hierochoensis Pedley **sp. nov.** affinis *A. hendersonii* Pedley et *A. johnsonii* Pedley; ab *A. hendersonii* phyllodiis interdum angustioribus et floribus minoribus et ab *A. johnsonii* ramulis glabris, phyllodiis semper glabris plerumque brevioribus non sigillatim sulcatis longitudinaliter et ab utrisque phyllodiis glandibus parvis 3–5 mm e basi (1 mm intus vel in *A. johnsonii* plerumque carenti) pulvino breviore praeditis et ovario piloso differt. **Typus:** Queensland. South Kennedy District: Near ‘Blairgowie’ Station on road to Aramac, 18 August 1999, *A. Marks 325-1* (holo: BRI).

Acacia sp. (Jericho G.R. Beeston 1065C); Holland & Pedley (1997: 118; 2002: 114); CHAH (2006); Pedley (2007: 114; 2010: 109; 2017).

Shrub to *c.* 2 m tall; branchlets pale brown, prominently ribbed, resinous; young tips dark brown, resinous; stipules subulate, *c.* 1 mm long, persistent. Phyllodes spirally arranged, somewhat crowded, narrowly oblanceolate, straight or slightly recurved, (8–)11–18 mm long, (0.8–)1–1.6 mm wide, (8–)10–13 times longer than wide, short oblique mucro at the obtuse tip, thick, glabrous, with a few small tubercles on lower margin, one prominent longitudinal nerve, usually with a few obscure longitudinal folds on each face when dry; small gland on margin 3–5 mm from base; pulvinus 0.2–0.3 mm long. Flowers in globose heads of *c.* 30 flowers on glabrous resinous peduncles 6–8 mm long, single in upper axils, no basal bracts; bracteoles ovate, *c.* 2 mm long, thick, rather rough dorsally with scattered minute adpressed hairs. Flowers 5-merous; sepals glabrous, membranous, 0.7–0.8 mm long, lobes uninerved, united to within *c.* 0.2 mm of tip, free part triangular, thickened; petals glabrous, uninerved, united to about the middle, 1.5–1.6 mm long; stamens *c.* 3 mm long; ovary tomentose. Pods not seen. **Fig. 2.**

***Additional specimens examined*: Queensland.** South Kennedy District: 35 km SE of Jericho, Jul 1993, *Thompson JER141 & Figg* (BRI). Mitchell District: Jericho, Jun 1913, *Boorman s.n.* (BRI [AQ626282], ex NSW); 15 km NE of Jericho, Jul 1975, *Beeston 1065C* (BRI).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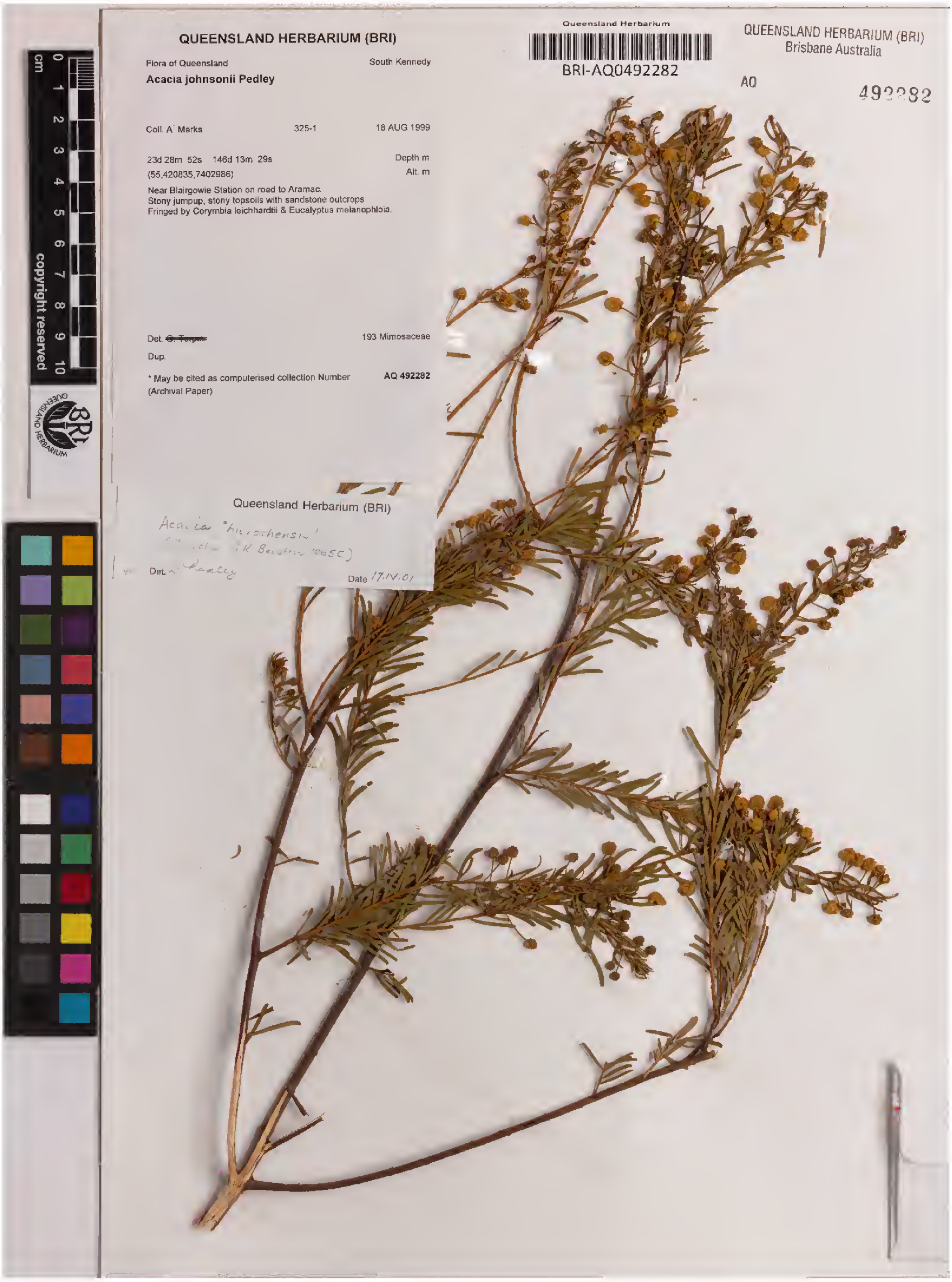
QUEENSLAND HERBARIUM
BRI
QUEENSLAND HERBARIUM (BRI)
Flora of Queensland
South Kennedy
Acacia conferta A.Cunn. ex Benth.
Coll. R.J. Fairfax 405
15 JAN 2001
Butler, D.;
22d 28m 26s 147d 52m 29s [AGD66]
Depth m
(55,589969,7514447) (8453-899144)
Alt m
Mt Castor, Gemini Peaks section of Peak Range National Park.
Cliff face. Skeletal soil. Igneous rock Not seen on scree slope.
Ball shaped flowers.
Det. L.E. Pedley
JUL 2016
193 Mimosaceae
Dup.
be cited as computerised collection Number AQ 522143
QUEENSLAND HERBARIUM (BRI)
Brisbane Australia
AQ 522143
Queensland Herbarium
BRI-AQ0522143
Queensland Herbarium (BRI)
Det. L. Pedley 30
Date

Fig. 1. Holotype of ***Acacia castorum*** (*Fairfax 405 & Butler s.n.*, BRI).


QUEENSLAND HERBARIUM (BRI)

Flora of Queensland South Kennedy

Acacia johnsonii Pedley

Coll. A. Marks 325-1 18 AUG 1999

23d 28m 52s 146d 13m 29s Depth m

(55,420835,7402986) Alt. m

Near Blairgowie Station on road to Aramac.
Stony jumpup, stony topsoils with sandstone outcrops
Fringed by Corymbia leichhardtii & Eucalyptus melanophloia.

Det. ~~G. Turpin~~ 193 Mimosaceae

Dup.

* May be cited as computerised collection Number AQ 492282
(Archival Paper)

Queensland Herbarium (BRI)

Acacia 'hierochensis'

([illegible] R Bartlett 1005C)

Det. Pedley Date 17.IV.01

Queensland Herbarium

BRI-AQ0492282

QUEENSLAND HERBARIUM (BRI)
Brisbane Australia

AQ 492282

Fig. 2. Holotype of ***Acacia hierochoensis*** (*Marks 325-1*, BRI).

***Distribution and habitat*:** *Acacia hierochoensis* is only known from a small area within 50 km of Jericho, central Queensland. It has been recorded from woodland dominated by *Eucalyptus cloeziana* F.Muell. and *E. crebra* on shallow sandy soils derived from sandstone.

***Notes*:** *Acacia hierochoensis* is mostly closely related to *A. hendersonii*, both of which were included in the concept of *A. johnsonii* by Maslin (2001: 458). It differs from both species in its pilose ovary, its phyllodes with a shorter pulvinus and a gland 3–5 mm from the base. It has smaller flowers and usually shorter phyllodes than *A. hendersonii* and differs from *A. johnsonii* in having glabrous branchlets and usually shorter glabrous phyllodes that are not markedly sulcate.

Maiden (1920) briefly discussed the *Boorman* specimen cited above when he described *Acacia pilligaensis* Maiden.

***Etymology*:** The specific epithet is derived from *hierocho,* the Latin name of the biblical city of Jericho.

Phyllodes uninerved; heads in axillary racemes [*Acacia* sect. *Phyllodineae*].

Acacia forsteri Pedley **sp. nov.** affinis *A. penninervi* Sieber ex DC. var. *penninervi* et distantiore *A. decorae* Rchb. f. ab hac phyllodiis minoribus, ab illo phyllodiis glandulis singulis ornatis, inflorescentiis glabris, capitulis pallidioribus, ab utrisque floribus paucioribus in capitulo saepe aliquantum grandioribus et praecipue leguminibus plerumque brevioribus et latioribus seminibus transverse ordinatis differt. **Typus:** Queensland. BURNETT DISTRICT: ‘Bronte’, 9 km WSW of Gayndah, 28 June 2000, *P.I. Forster PIF25856* (holo: BRI, iso: A, AD, CANB, DNA, K, MEL, MO, NSW, PERTH *distribuendi*).

Spreading shrub 3 m high; branchlets glabrous; young tips brownish; stipules *c.* 0.5 mm long deciduous. Phyllodes grey-green, straight, 43–50(–54) mm long, 6.5–9(–10) mm wide, 5–7(–7.8) times longer than wide, glabrous; one distinct longitudinal nerve and obscurely irregularly penninerved; gland 10–16 mm from the base, connected to the midrib by a fine nerve, margin slightly indented at gland, tip obtuse or somewhat acute; pulvinus *c.* 1 mm long. Flowers in globose heads of 10–15 flowers in axillary racemes with up to 15 branches; axis to 4 cm long including peduncle 4–6 mm long; branches 4–6 mm long subtended by small bract; all glabrous; bracteole peltate about as long as calyx, lamina fimbriate. Flowers pale yellow, 5-merous; calyx cupular, 0.5–0.6 mm long, sinuolately lobed, fimbriate with fine hairs; corolla 1.4–1.5 mm long, glabrous, lobed to about the middle, lobes uninerved; stamens *c.* 3 mm long; ovary glabrous. Pod oblong, straight, flat, usually 3.5–6 cm long, 16–24 mm wide; valves coriaceous, glabrous, pruinous, faintly transversely veined. Seeds transverse in pod, black, oblong in outline, *c.* 5.5 × 3.3–4.5 mm; areole oblong; pleurogram fine, a little depressed, closed; funicle folded several times, thickened, forming an oblique terminal yellow-brown aril. **Fig. 3.**

***Distribution and habitat*:** *Acacia forsteri* is known only from the type collection. At the type locality the species occurs in woodland on a duricrust jump-up, with the dominant canopy species being *Corymbia citriodora* subsp. *variegata* (F.Muell.) A.R.Bean & M.W.McDonald, *C. trachyphloia* subsp. *trachyphloia*, *Eucalyptus decorticans* (F.M.Bailey) Maiden and *Lysicarpus angustifolius* (Hook.) Druce. It co-occurs with one other local endemic – the **Vulnerable** listed *Boronia grimshawii* Duretto, as well as the **Endangered** *Zieria inexpectata* Duretto & P.I.Forst.

***Notes*:** *Acacia forsteri* is closely related to *A. penninervis* var. *penninervis*, but differs in having smaller phyllodes and, more significantly, much wider and shorter pods that are not contracted between the seeds. A relationship to *A. decora* is also possible, but is more distant.

***Etymology*:** The species is named in honour of Dr Paul I. Forster from the Queensland Herbarium, colleague and friend, who has made many valuable collections, often in remote parts of the state.

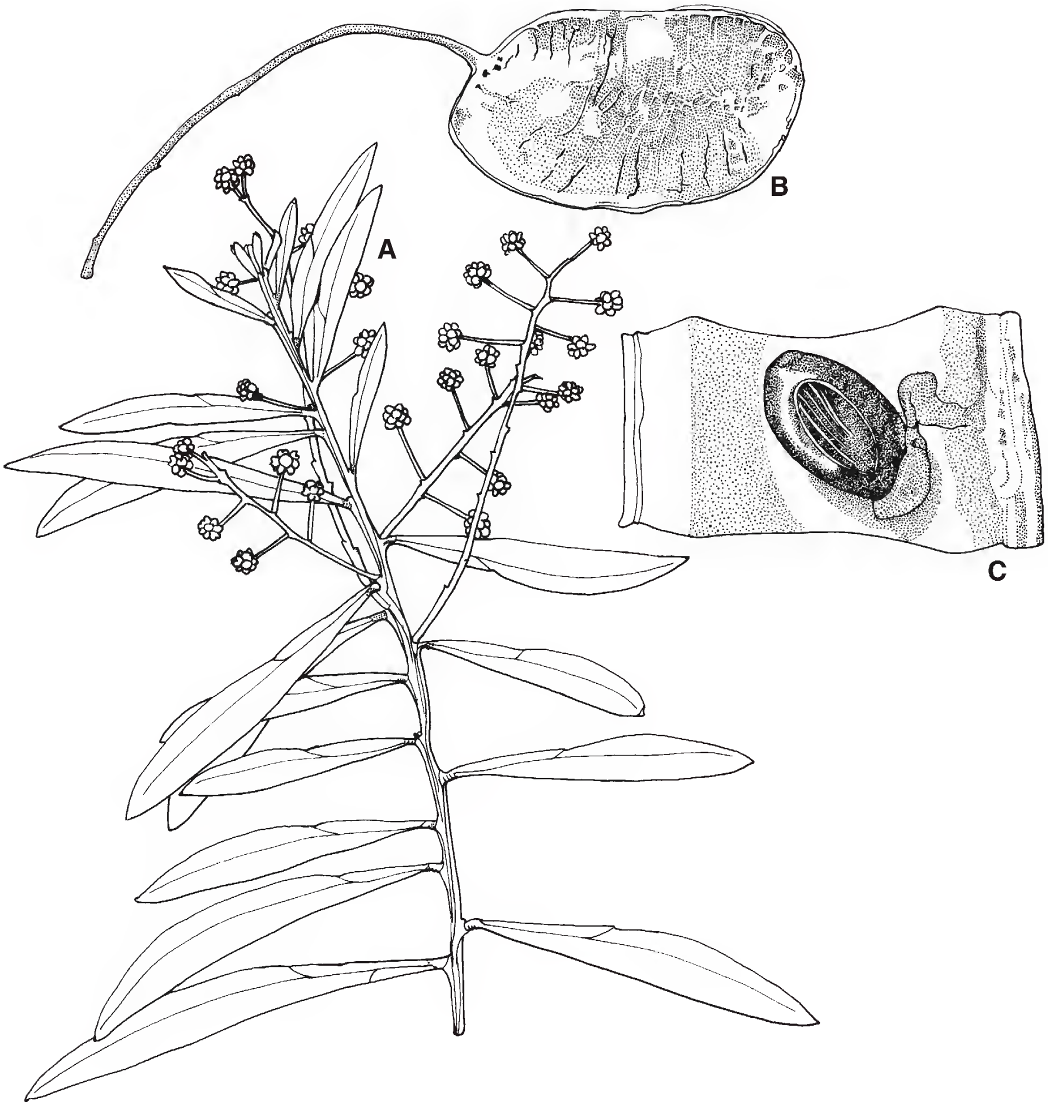


Fig. 3. ***Acacia forsteri***. A. habit of twig with phyllodes and inflorescences ×1.2. B. pod ×1. C. seed *in situ* with funicle ×4. All from *Forster PIF25856* (BRI). Del. W. Smith.

Leaves not phyllodinous; heads in axillary racemes [*Acacia* sect. *Botrycephalae*].

Acacia anadenia Pedley **sp. nov.** affinis *A. chinchillensi* Tindale et *A. argentinae* Pedley; ab illa foliolis grandioribus latioribus et ab utrisque ramulis pilis crispis obtectis, foliis sine glandulis in speciminibus vidi (forsan non semper speciei), pinnarum axibus ultra foliolis projectis, ovario legumineque glabro differt. **Typus:** Queensland. WARREGO DISTRICT: Mt Mobil House, Chesterton [Range] National Park, 30 August 1996, *C. Dollery 127* (holo: BRI).

Shrub to *c.* 1 m tall; branchlets ribbed, indumentum of long, moderately dense, crisped hairs; young growing points brownish; stipules deltoid, *c.* 1 mm long. Leaves: glands absent; axis (pulvinus, petiole and rachis included) 2–4 cm long, ridged adaxially; petiole (including pulvinus *c.* 1.5 mm long) 7–11 mm long; 2–4 pairs of pinnae, their axes 22–40 mm long markedly projecting beyond the most distal pair of leaflets; 7–11 pairs of leaflets per pinna; leaflets oblong, obtuse or acutish, rounded at base, (3.5–)6.5–9 mm long, 1.5–2.2 mm wide, 3.5–4.7 times longer than wide, moderately dense crisped hairs beneath, a few scattered hairs above, midrib prominent beneath; petiolules *c.* 0.2 mm long. Flowers in globose heads of 18–24 flowers, *c.* 5 mm diameter, arranged in up to 10-branched axillary racemes; axis usually 2.5–3 cm long (including peduncle 5–10 mm long) with indumentum of branchlets; branches, 2.5–3 mm long, subtended by acute bract 0.7–1 mm long. Flowers 5-merous; calyx obconical, lobed to middle, *c.* 0.8 mm long, tube glabrous, lobes fimbriate; corolla lobed to about level of calyx, *c.* 1.3 mm long, midribs of lobes distinct; stamens 2.5–3 mm long; ovary glabrous. Pods (seen when over-mature, but containing seeds), linear straight or somewhat curved, to *c.* 9 cm long with about 10 seeds, 5.5–6 mm wide; valves smooth, glabrous, pruinose. Seeds arranged longitudinally, oblong in outline, *c.* 7.5 × 3–3.5 mm, with a large oblong areole, pleurogram open; distinct clavate aril. **Fig. 4.**

***Additional specimen examined*:** **Queensland.** MARANOA DISTRICT: Chesterton Range NP, Nov 1997, *Dollery s.n.* (BRI [AQ659044], NSW).

***Distribution and habitat*:** *Acacia anadenia* is known only from the Chesterton Range National Park some 35 km ENE of Morven in southwestern Queensland. It has been collected in *Callitris* (probably *C. glaucophylla* Joy Thomps. & L.A.S.Johnson) and *Eucalyptus* woodland on “sandy undulating slopes”.

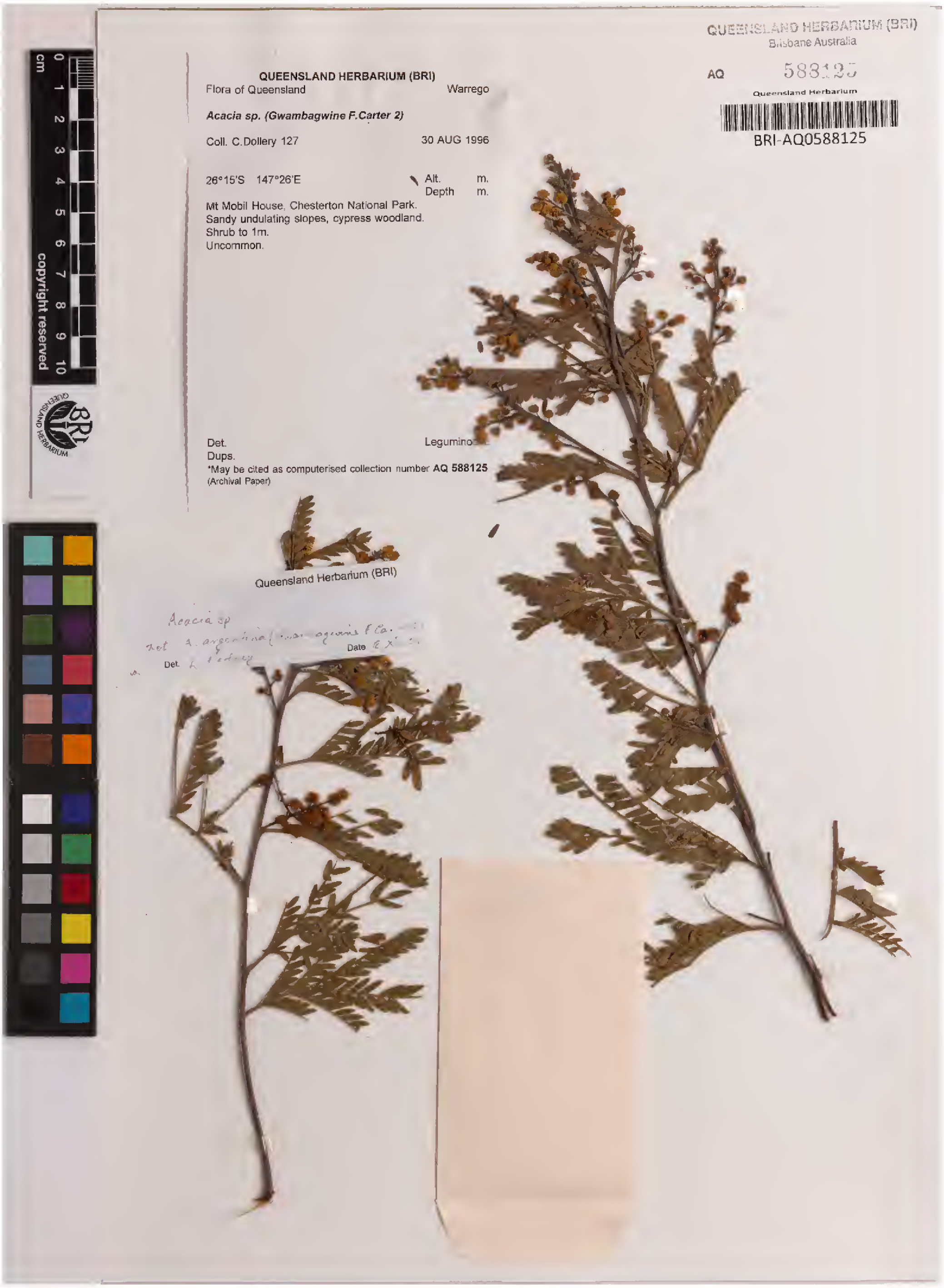
***Notes*:** *Acacia anadenia* is related to both *A. chinchillensis* and *A. argentina*, both of which have silvery foliage and hairy branchlets and leaflets. It differs from both in having crisped hairs on branchlets and leaf axes, the lack of foliar glands, the pinna axes projecting conspicuously beyond the most distal pair of leaflets and glabrous pods and ovary. As in others of the group, the lack of glands may not be a constant characteristic of the species.

Acacia anadenia is the second endemic vascular plant to be described from the Chesterton Range National Park area; the other being *Bertya calycina* Halford & R.J.F.Hend. The two species are not known to co-occur.

***Etymology*:** The specific epithet is a Latin adjective derived from the Greek *adena, adenos*, “gland” with the prefix *an-*, “without”, an allusion to the lack of foliar glands on the specimens examined.

Acacia parvifoliolata Pedley **sp. nov.** quoad ramulos rufescentes pruinosos et pinnas late sejunctos secus rhachidem foliorum affinis *A. pruinosae* A.Cunn. ex Benth. et *A. debili* Tindale autem ab utrisque glandula petiolari carenti et floribus minoribus et praesertim foliolis multo minoribus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Boyd Creek, State Forest 46, *c.* 70 km W of Taroom, 10 September 2002, *A.R. Bean 19248* (holo: BRI [2 sheets]; iso: K, MEL, NSW, *distribuendi*).

Acacia sp. (Boyd Creek A.R.Bean 19248); CHAH (2006); Pedley (2007: 114; 2010: 109; 2017).



QUEENSLAND HERBARIUM (BRI)
Flora of Queensland Warrego
Acacia sp. (Gwambagwine F.Carter 2)
Coll. C.Dollery 127 30 AUG 1996
26°15'S 147°26'E Alt. m. Depth m.
Mt Mobil House, Chesterton National Park.
Sandy undulating slopes, cypress woodland.
Shrub to 1m.
Uncommon.
Det. Leguminosae
Dups.
*May be cited as computerised collection number AQ 588125
(Archival Paper)

Queensland Herbarium (BRI)
Acacia sp
not A. argentina [illegible]
Det. [illegible] Date [illegible]

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copyright reserved
QUEENSLAND HERBARIUM
BRI
QUEENSLAND HERBARIUM (BRI)
Brisbane Australia
AQ 588125
Queensland Herbarium
BRI-AQ0588125

Fig. 4. Holotype of ***Acacia anadenia*** (*Dollery 127*, BRI).

Spindly shrub to *c*. 4 m tall; bark smooth throughout and ± pruinose; all parts glabrous, except for one or two short hyaline hairs on some calyx lobes; branchlets terete, dark red-brown (rufescent), ± pruinose when young; stipules triangular to 0.5 mm long. Leaves: axis (petiole and rachis included) 6.5–11 cm long; petiole (including pulvinus *c*. 4 mm long) 2.5–3.5(–5) cm long; intrajugal length 15–20 mm; 3–6 pairs of pinnae, their axes 35–45(–55) mm long; (20–)25–35 pairs of leaflets on each pinna; leaflets oblong, obtuse, 3.5–5.5 mm long, 1–1.5 mm wide, midrib obscure beneath. Flowers in globose heads of *c*. 25 flowers, *c*. 7.5 mm diameter, described as bright yellow, arranged in 5–12-branched racemes in the upper axils, the axis usually 3.5–6 cm long, peduncle 5–15 mm long; branches, subtended by stipule-like bract, 5–7 mm long. Flowers 5-merous; calyx turbinate, *c*. 1 mm long, lobes broad, obtuse, slightly inrolled, *c*. 0.3 mm long, occasionally with a hair or two; corolla *c*. 1.5 mm long, lobed to about the middle, the lobes faintly uninerved; stamens *c*. 3 mm long; ovary glabrous. Pods (only detached dehisced ones seen and broadly similar to those of most other species of *Acacia* sect. *Botrycephalae*) to *c*. 65 mm long, 6–6.5 mm wide, straight, raised over seeds; valves chartaceous, slightly shiny, some transverse anastomosing veins. Seeds not seen, probably longitudinal or slightly oblique in pod. **Fig. 5.**

***Distribution and habitat*:** *Acacia parvifoliolata* is known only from the type collection west of Taroom in the central highlands of Queensland. It was noted to be common but localised along a creek in a woodland of *Eucalyptus chloroclada* (Blakely) L.A.S.Johnson & K.D.Hill, *E. mediocris* L.A.S.Johnson & K.D.Hill, *Angophora leiocarpa* (L.A.S.Johnson ex G.J.Leach) K.R.Thiele & Ladiges and *Allocasuarina inophloia* (F.Muell. & F.M.Bailey) L.A.S.Johnson on quartzitic sandstone.

***Notes*:** *Acacia parvifoliolata* is related to *A. pruinosa* and *A. debilis* both of which have similar reddish brown branchlets and leaf rachises, but it has considerably smaller leaflets that are more widely separated and the leaf rachises lack foliar glands.

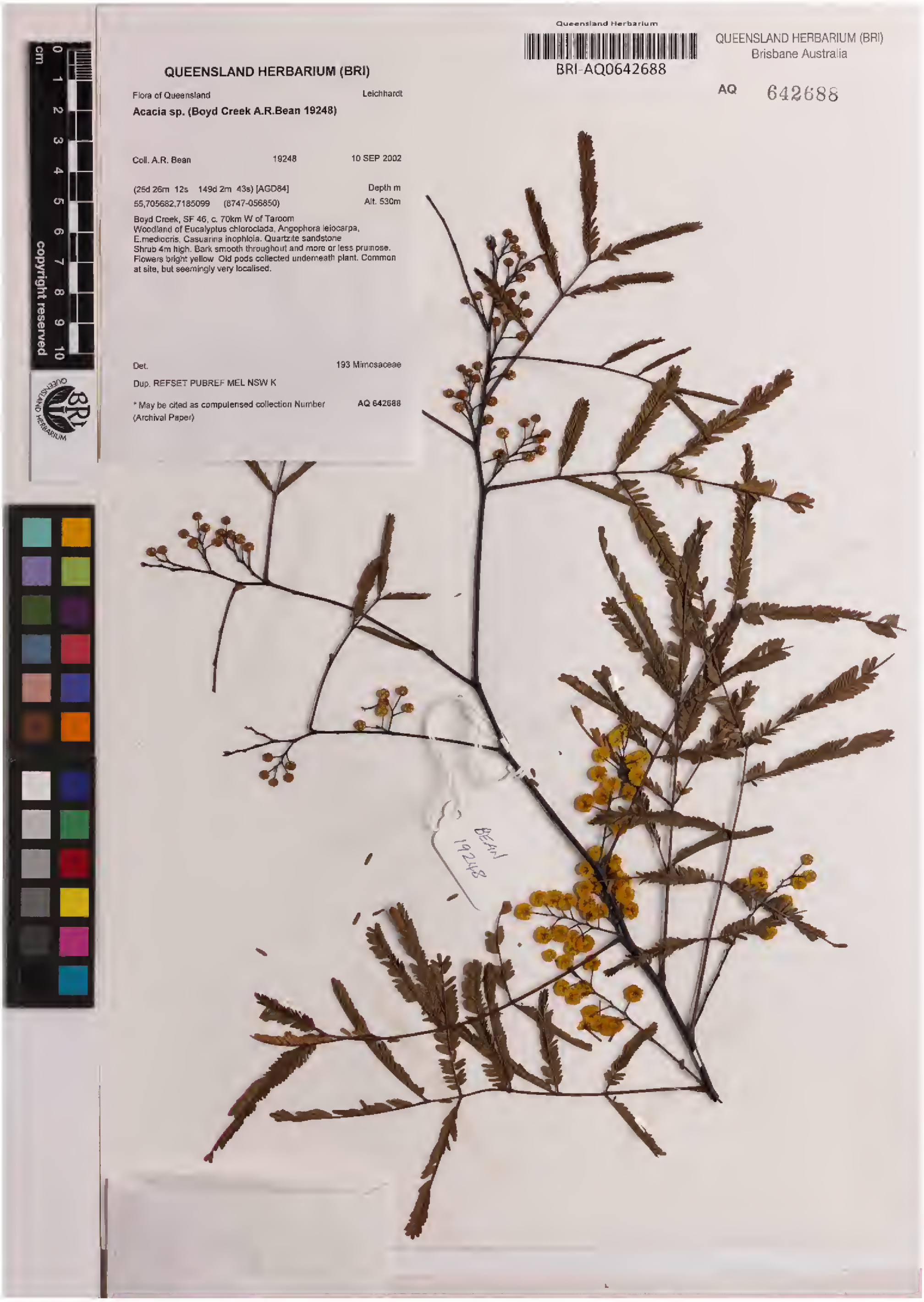
***Etymology*:** The specific epithet is derived from Latin *parvus*, "small", *foliola*, "leaflet" and the adjectival suffix *-ata*, indicating possession or likeness: an allusion to the leaflets of the species, which are remarkably smaller than those of related species.

Phyllodes plurinerved; flowers in heads [*Acacia* sect. *Plurinerves*].

Acacia philoxera Pedley **sp. nov.** affinis *A. papyrocarpae* Benth. et *A. loderi* Maiden a quibus phyllodiis grosse pungentibus nervis plerumque manifestis prominentibus (in plantis exsiccatis), floribus majoribus capitulis in paribus axillaribus, calyce minus profunde diviso differt. **Typus:** Queensland. GREGORY SOUTH DISTRICT: Grey Range, 80 km west of Thargomindah, 15 October 1997, *M. Handley 250* (holo: BRI [AQ659041]).

Acacia sp. Boongeena Creek (R. Bennett AQ378136); CHAH (2006).

Bushy shrub to small tree to 5 m tall; branchlets obscurely ribbed, dense indumentum of white minute (< 0.1 mm long) adpressed hairs, glabrescent or hairs persisting in axils of phyllodes; stipules not seen. Phyllodes linear, straight, rigid, terete or slightly flattened, (5–)7–12 cm long, 1– 1.4 mm wide, acuminate with a coarsely pungent point, densely adpressed pubescent when young, glabrescent, numerous parallel longitudinal nerves, usually prominent on dried specimens; pulvinus 1–1.5 mm long; gland small, basal or up to 2 mm from base. Flowers in globose heads of 12–20 flowers in pairs in upper axils a rudimentary axis between them, receptacle puberulous, bracteole spathulate; peduncles 5–7 mm long, adpressed pubescent, subtended by basal concave bract *c*. 1 mm long. Flowers 5-merous; calyx 0.7–0.9 mm long, lobed to about the middle, the lobes obtuse, sparsely adpressed pubescent; corolla 1.5–1.6 mm long, lobed to about the middle, scattered adpressed hairs towards the base; stamens *c*. 3 mm long; ovary scurfy and adpressed pubescent. Pods linear, ± straight, to 10 cm long, *c*. 5 mm wide, valves coriaceous, glabrous, brown, with longitudinal anastomosing veins. Seeds



QUEENSLAND HERBARIUM (BRI)

Flora of Queensland Leichhardt

Acacia sp. (Boyd Creek A.R.Bean 19248)

Coll. A.R. Bean 19248 10 SEP 2002

(25d 26m 12s 149d 2m 43s) [AGD84] Depth m

55,705682,7185099 (8747-056850) Alt. 530m

Boyd Creek, SF 46, c. 70km W of Taroom
Woodland of Eucalyptus chloroclada, Angophora leiocarpa,
E.mediocris, Casuarina inophloia. Quartzite sandstone
Shrub 4m high. Bark smooth throughout and more or less pruinose.
Flowers bright yellow Old pods collected underneath plant. Common
at site, but seemingly very localised.

Det. 193 Mimosaceae

Dup. REFSET PUBREF MEL NSW K

* May be cited as compulensed collection Number AQ 642688
(Archival Paper)

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Fig. 5. Holotype (sheet 1 of 2) of ***Acacia parvifoliolata*** (*Bean 19248*, BRI).

longitudinal, 6–7 mm long, 3–3.5 mm wide, thin; pleurogram faint, open; funicle with about five tight folds forming small terminal aril. **Figs. 6–9.**

***Additional specimens examined*: Queensland.** Gregory South District: Near Boongeena Creek, 10 km E of Cooper Creek, Aug 1984, *Bennett s.n.* (BRI [AQ378136]); 80 km W of Thargomindah, Grey Range, Jul 1999, *Simmons 3958 & Simmons* (BRI); *ibid*, Nov 2000, *Handley 250 & Handley* (BRI [AQ497541]).

***Distribution and habitat*:** *Acacia philoxera* is currently known from four (only two currently documented with vouchers) localised populations 80–86 km west of Thargomindah beside the Bulloo Developmental Road in its transect of the Grey Range in southwestern Queensland (J. Silcock, pers. comm. Dec 2018). The population from which Bennett made the 1984 collection has not been relocated (J. Silcock, pers. comm. Dec 2018). Away from the main road, there appears to be suitable habitat directly to the south on Orient Station and to the north on Nockatunga and Norley Stations and searches for the species should be made on these properties (J. Silcock, pers. comm. Dec 2018).

At the populations west of Thargomindah, *Acacia philoxera* is associated with *A. cambagei* R.T.Baker, and to a lesser extent with *A. aneura* F.Muell. ex Benth., *A. ensifolia* Pedley and *A. sibirica* S.Moore, generally on areas of rocky clay on the lower slopes and drainage lines of low rises **(Figs. 7, 8)**. The understorey is mainly composed of a sparse cover of chenopods and grasses (J. Silcock, pers. comm. Dec 2018). The Boongeena Creek record was from gibber downs on a low hillside above a creek. *Acacia philoxera* has not been observed to occur on the gentler, sandier slopes with *A. aneura* and *A. sibirica* – the locally dominant species association in this area (J. Silcock, pers. comm. Dec 2018).

***Notes*:** The nearest relatives of *Acacia philoxera* are putatively *A. papyrocarpa* and *A. loderi*, from which it differs in having more coarsely pungent phyllodes with more prominent longitudinal nerves (at least when dry), larger heads in axillary pairs and a less deeply divided calyx. It occurs outside the geographic range of these related species that are distributed widely in the southern arid part of Australia and do not occur in Queensland.

Acacia philoxera could be the same taxon discussed by Cowan & Maslin (2001) as "*A.* sp. aff. *[A.]papyrocarpa*" based on some collections from South Australia. If this proves to be the case, then the widely scattered populations of the species would be unusual, but no more so than for *A. minyura* Randell, *A. laccata* Pedley, *A. cyperophylla* F.Muell. ex Benth. var. *cyperophylla* and *A. catenulata* C.T.White (excluding the Western Australian subspecies which is probably specifically distinct).

It should be noted that the collector of the type specimen used their collecting number 250 on two different dated occasions. Both collections probably originate from the same individual tree; however, the 17 October 1997 dated collection is clearly indicated above as being the specimen used as the type for this species.

***Etymology*:** The specific epithet is formed from a compound of Greek *philo-*, "loving, fond of" and *xeros*, "dry". The species habitat is particularly arid.

Phyllodes plurinerved; flowers in spikes [*Acacia* sect. *Juliflorae*].

Acacia pudica Pedley **sp. nov.** quoad costas resinamque ramulorum et magnitudinem nervationemque phyllodiorum et leguminum *A. wickhamii* Benth. subsp. *wickhamii* persimilis autem nervis secundariis phyllodiorum inconspicuis magnis intervallis et praecipue calyce in lobos angustos diviso differt. **Typus:** Queensland. Burke District: 32 km NNW of Kajabbi, 29 May 1994, *P.L. Harris 711* (holo: BRI).

Shrub to 2 m tall and half as wide; bark grey, longitudinally fibrous but not minniritchi; branchlets slender, pale brown, with prominent ribs, crenulated when old; young tips brown; stipules minute, early deciduous. Phyllodes thick, ovate, dimidiate, straight or slightly sigmoid, (16–)20–30 mm long, 4.5–7.5 mm wide, 3.5–5 times longer than wide, plurinerved, nerves rather obscure, but two or three more prominent than the rest, secondary

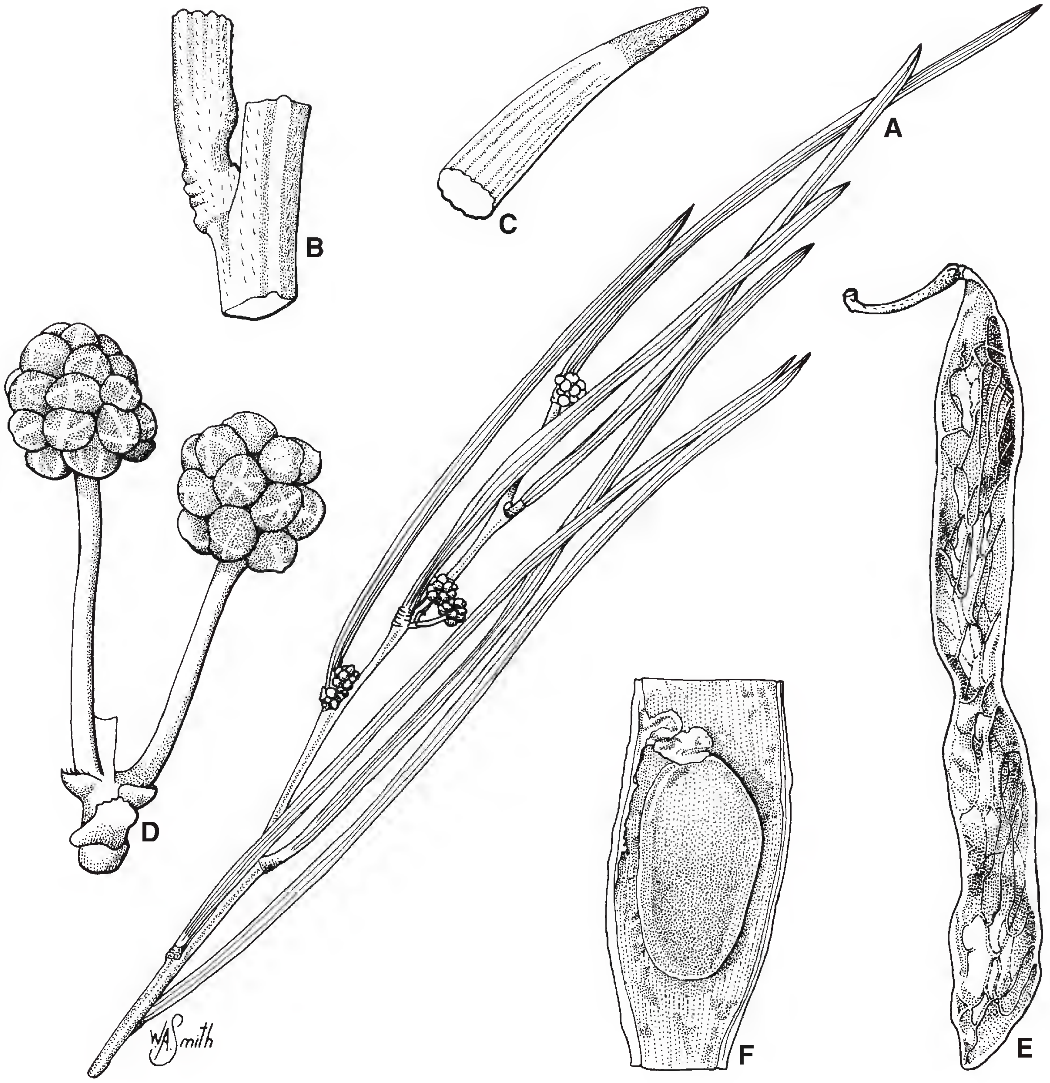


Fig. 6. ***Acacia philoxera***. A. habit of twig with phyllodes and inflorescences ×1.5. B. proximal end of phyllode with attachment to stem ×8. C. apical portion of phyllode ×8. D. paired inflorescence ×8. E. pod ×2. F. seed *in situ* with funicle ×4. All from *Handley 250* (BRI) [AQ659041]. Del. W. Smith.

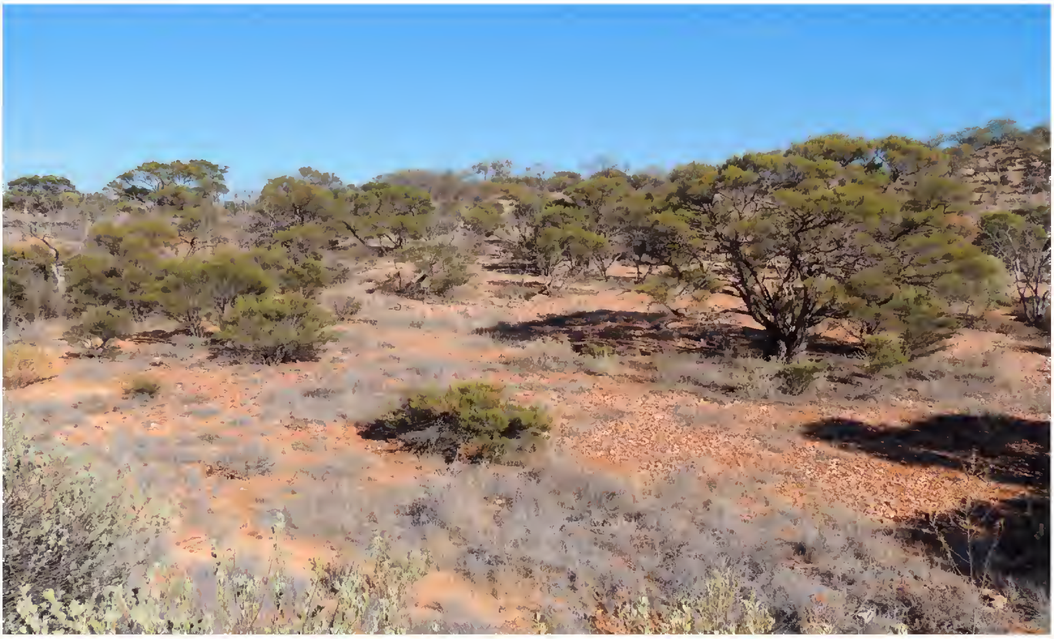


Fig. 7. ***Acacia philoxera*** community, 80 km west of Thargomindah (Photo: J. Silcock).

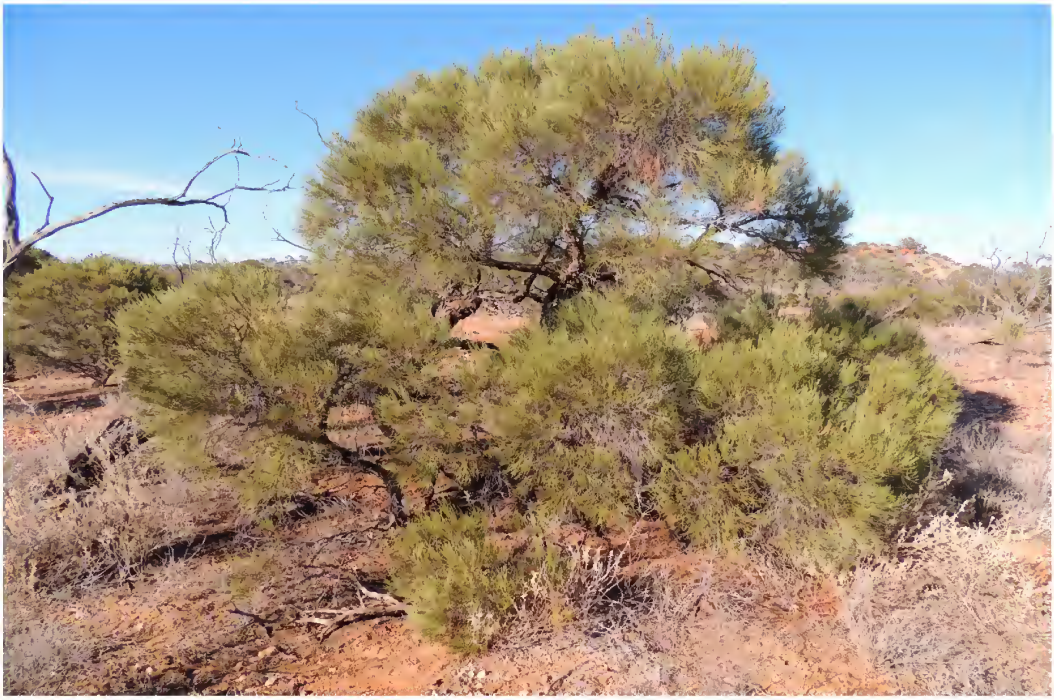


Fig. 8. Habit of ***Acacia philoxera***, 80 km west of Thargomindah (Photo: J. Silcock).

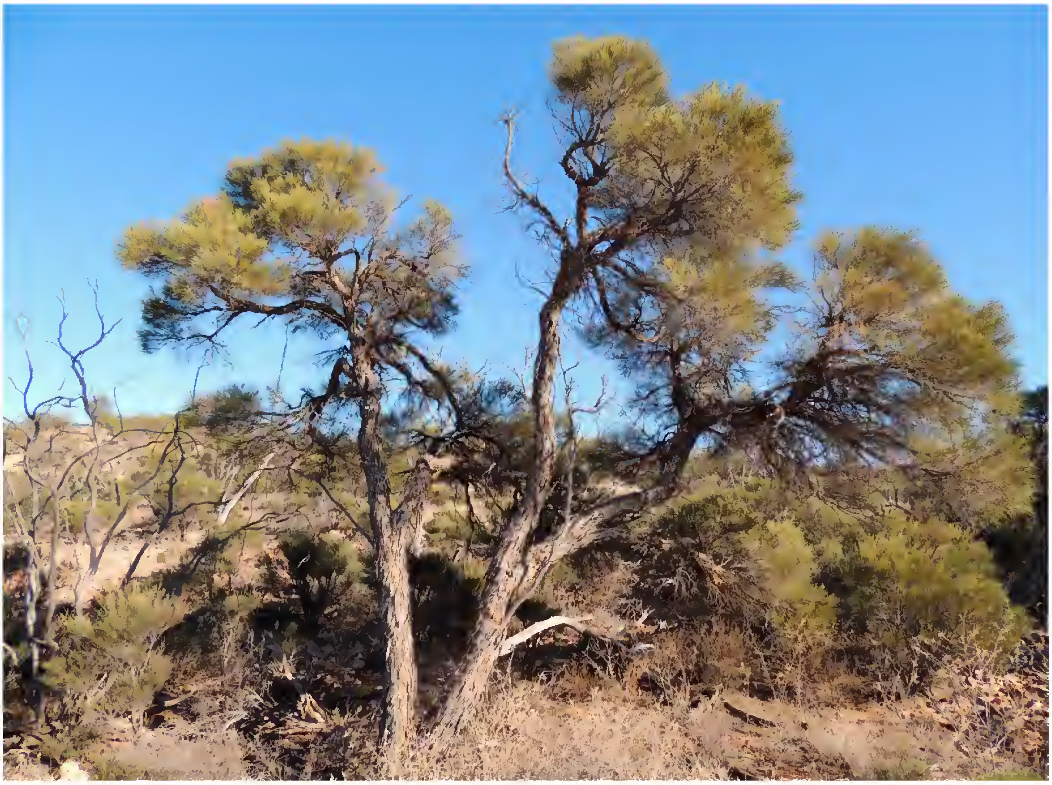


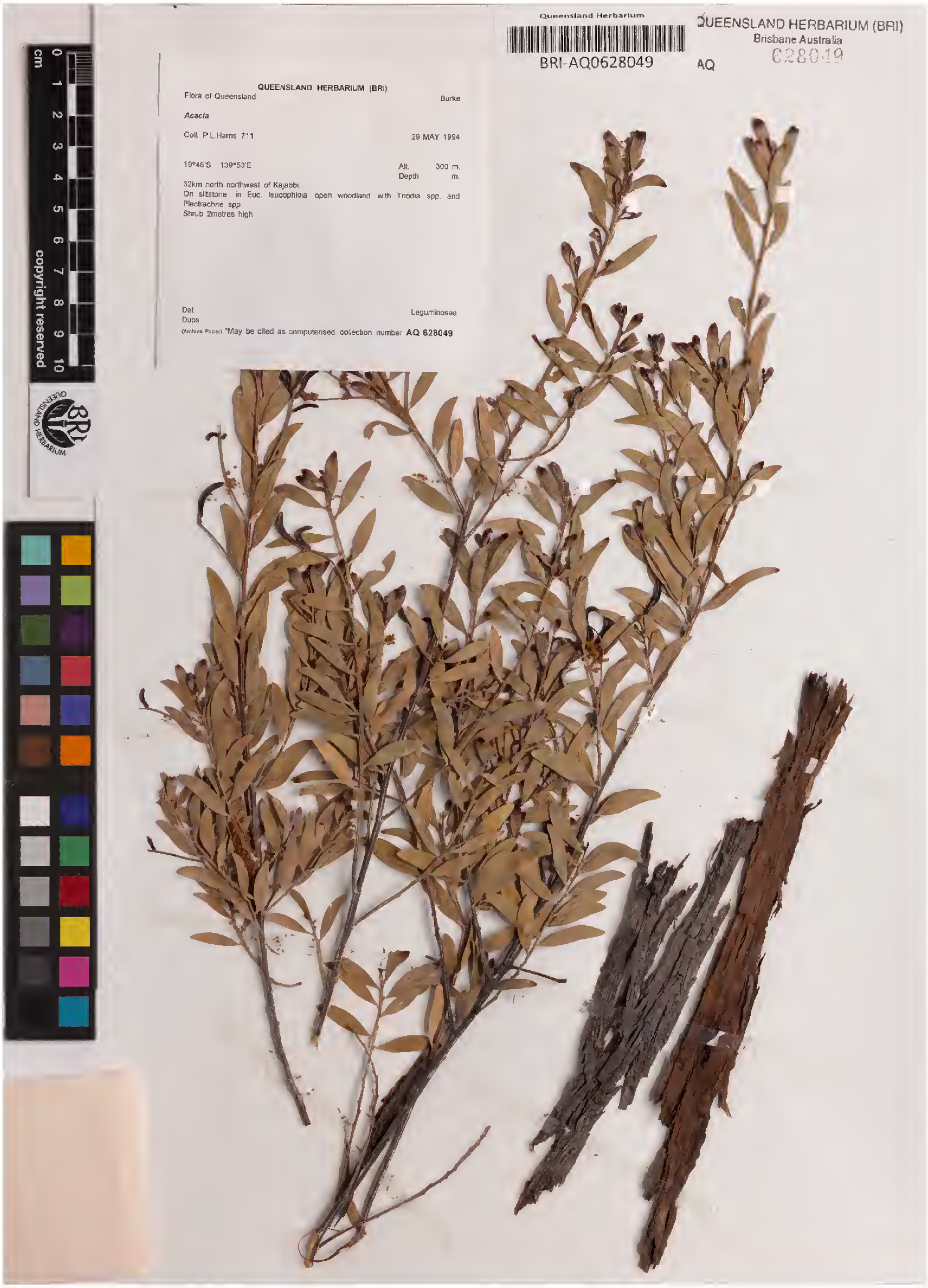
Fig. 9. Habit of ***Acacia philoxera*** showing bark, 80 km west of Thargomindah (Photo: J. Silcock).

nerves rather widely spaced, few anastomoses, small, well defined, knob-like mucro; pulvinus *c.* 1 mm long, scurfy. Flowers in moderately dense spikes that are single in upper axils, 20–25 mm long, peduncles 8–10 mm long, glabrous, subtended by a concave triangular bract *c.* 1 mm long, rachis somewhat scurfy and with scattered adpressed hyaline and red-glandular hairs; bracteoles obliquely peltate, stipe *c.* 0.4 mm long, lamina acute, *c.* 0.2 mm, a few red-glandular hairs. Flowers 5-merous; calyx 0.6–0.7 mm long, divided almost to the base into linear lobes, tips slightly thickened with red-glandular hairs; corolla *c.* 1 mm long, glabrous, divided to the middle, lobes with distinct midribs; stamens *c.* 2 mm long; ovary densely white-tomentose. Pods oblong, narrowed to base, opening elastically from tip, *c.* 3 cm long, 6–8 mm wide, valves woody, margins thickened, obliquely veined and slightly shiny. Seeds oblique, dark brown to black, oblong in outline, 4–6 mm long, 1.8–2.2 mm wide; areole oblong, rather large with a pale halo; pleurogram open; funicle grey, folded 3 or 4 times forming a small cupular aril over the seed. **Fig. 10.**

***Additional specimens examined*: Queensland.** BURKE DISTRICT: 32 km NNW of Kajabbi, Jun 1993, *Harris 697* (BRI); *ibid*, Aug 1993, *Harris 701* (BRI).

***Distribution and habitat*:** *Acacia pudica* is known only from the type locality in the upper catchment of Eureka Creek, NNW of Kajabbi in north-west Queensland where it was reported to occur on siltstone in an open woodland of *Eucalyptus leucophloia* subsp. *euroa* L.A.S.Johnson & K.D.Hill with an understorey of *Plectrachne* and *Triodia* spp.

***Notes*:** *Acacia pudica* is closely related to *A. wickhamii* subsp. *wickhamii,* differing in the less conspicuous widely spaced secondary nerves of its phyllodes and, possibly more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Flora of Queensland Burke

Acacia

Coll. P.L.Harris 711 29 MAY 1994

19°46'S 139°53'E Alt. 300 m.
Depth m.

32km north northwest of Kajabbi.
On siltstone in Euc. leucophloia open woodland with Triodia spp. and Plectrachne spp
Shrub 2metres high

Det
Dups Leguminosae

(Archival Paper) *May be cited as computerised collection number **AQ 628049**

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QUEENSLAND HERBARIUM
BRI

Fig. 10. Holotype of ***Acacia pudica*** (*Harris 711*, BRI).

significantly, the deeply divided calyx. The latter character removes it from *A. wickhamii* and related species in the keys to species in the *Flora of Australia* (Maslin *et al.* 2001).

***Etymology*:** The specific epithet is a Latin word meaning “modest” or “bashful”, an allusion to the anonymity of the species.

Acacia lithgowiae Pedley, quoad phyllodiorum apices mucrone leviter obliquo ornatos, structuram longitudinemque leguminum seminumque *A. johnsonii* Pedley affine autem phyllodiis capitulis floribusque grandioribus differt. Quoad dimensiones nervationesque phyllodiorum *A. jensenii* Maiden similis autem pedunculis longis, leguminibus angustis sigillatim differt et probabiliter tantum remote cognata. Insuper fortasse affine *A. strictae* Andrews a qua ramulis pubescentibus, phyllodiis minus elongatis crassioribus et itaque nervationibus secundariis minus distinctis, capitulis grandioribus atroflavis singulis in axillis, leguminibus brevioribus differt. **Typus:** Queensland. Darling Downs District: Stretchworth State Forest (SF155), *c.* 40 km SW of Dalby, 6 August 2000, *D.M. Bennie 154* (holo: BRI, two sheets).

Shrub to 2.5 tall, branching from the base. Branchlets puberulous, not noticeably resinous, except for at shoot apices. Stipules lanceolate, 0.7–0.9 mm long, 0.3–0.5 mm wide, noticeably puberulous on margins, less so elsewhere. Phyllodes erect, linear, usually somewhat falcate, more rarely straight, flat, 15–48 mm long, 1.8–3.5 mm wide, narrowed at base; excentrically and obliquely mucronulate to rostellulate; green, sparsely puberulous on margins, soon glabrescent, waxy in irregular patches mainly on margins and midrib; obscurely 3-nerved, midrib fairly pronounced; gland minute, slightly (< 1 mm) above base, elliptic, 0.3–0.4 mm long, *c.* 0.2 mm wide. Inflorescence simple, single in upper axils; peduncles 4–5 mm long, puberulous and usually resinous near apices; bracteate at base. Flowers in globular heads, 6–7 mm across, 32–40-flowered, golden and somewhat resinous. Flowers 5-merous; sepals *c.* 2/3 united with acute lobes; corolla lobes lanceolate-ovate, 0.7–1 mm wide, *c.* 0.5 mm long; filaments 2–2.5 mm long; anthers *c.* 0.1 mm long. Pods firmly chartaceous, 10–55 mm long, 3.5–4.5 mm wide, with an irregular marginal suture, reddish-brown and markedly vernicose, apart from cream reddish-brown margins. Seeds longitudinally oblong, 3–3.5 mm long, (1–)1.5–2 mm wide, glossy black; aril oblique, cream. **Fig. 11.**

***Additional specimens examined* (all BRI, all from near the type locality):** Jun 2000, *Bennie 145*; Aug 2001, *Bennie 181*; Dec 2001, *Bennie 193*.

***Distribution and habitat*:** *Acacia lithgowiae* is known only from the type locality south-west of Dalby in southern Queensland where it occurs in sandy soil overlying clay. It is associated with *Allocasuarina luehmannii* (R.T.Baker) L.A.S.Johnson and, often *Acacia muelleriana* Maiden & R.T.Baker.

***Notes*:** The affinities of the species are obscure. It is probably most closely related to *A. johnsonii*, but has much larger phyllodes with the gland a little distance from the base, larger flowers and consequently larger flower-heads. Though the phyllodes are similar, the pods of *A. johnsonii* and other species related to *A. dictyophleba* F.Muell. are wider with transverse or oblique seeds. It also resembles *A. stricta*, but its phyllodes are thicker in texture with the secondary nervature not at all prominent. Its flower-heads are also larger, deeper in colour and occur in axillary pairs.

***Etymology*:** The species is named in honour of Ms Grace Lithgow, a keen naturalist (https://www.qnc.org.au/QNHA/qnha2007_GraceLithgow.htm), whose booklet (Lithgow 1997) on the wattles of the Murilla and Chinchilla shires is a fine account of the region’s rich *Acacia* flora. The type locality is a little south of the shires covered by Ms Lithgow’s booklet.

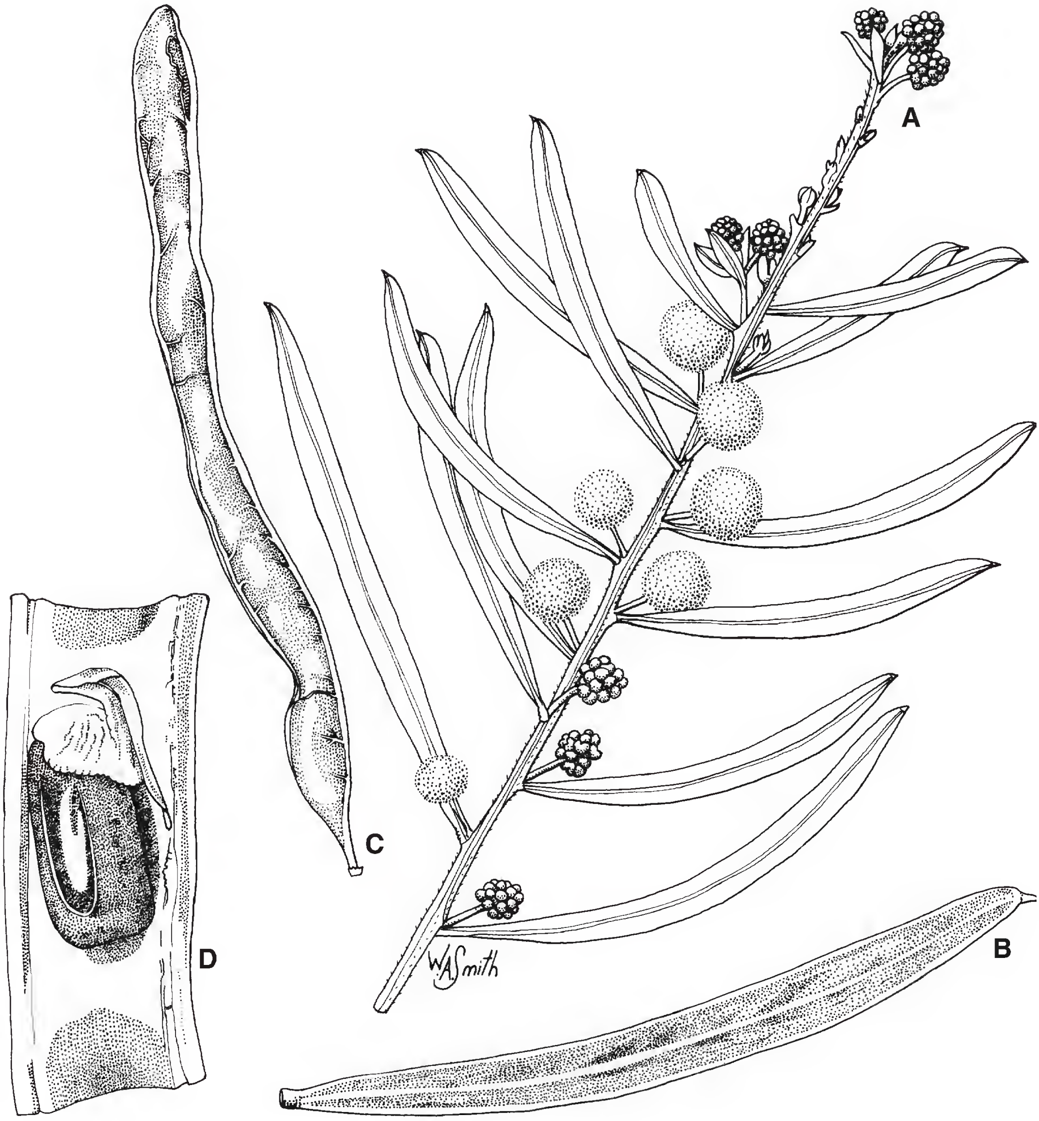

Fig. 11. ***Acacia lithgowiae***. A. habit of twig with phyllodes and inflorescences ×1.5. B. phyllode ×3. C. pod ×2. D. seed *in situ* with funicle ×8. A & B from *Bennie 154* (BRI, holotype); C & D from *Bennie 193* (BRI). Del. W. Smith.

Acacia ammitia Pedley **sp. nov.** affinis *A. leptostachyae* Benth. et *A. pubirhachi* Pedley. Ab illa nervis majoribus phyllodiorum basin neque inter se neque in marginem coalescentibus, leguminibus latioribus seminibus praeditis differt. Ab hac spicis distincte pedunculatis rachidibus minus dense pubescentibus, floribus aliquantum minoribus differt. Ab utrisque phyllodiis plus distincte falcatis mucrone prominenti juventute instructis et apprime nervis longitudinalibus late separatis praeditis, spicis sparsifloris differt. **Typus:** Queensland. Cook District: Mt Mulligan, southern end, Branch Creek Catchment, 8 July 1995, *P.I. Forster PIF17193, S.J. Figg & R. Jago* (holo: BRI, iso: CANB, DNA, K, MEL, MO, NSW).

Acacia sp. (Richards Creek J.R. Clarkson 5249); Holland & Pedley (1997: 118; 2002: 114); CHAH (2006); Pedley (2007: 114; 2010: 109; 2017).

Spreading shrub or tree to 5 m tall; branchlets ribbed below insertion of phyllodes, red-brown when mature, adpressed silvery hairs, on young ones; growing points silvery white; stipules deltoid, 0.7–1 mm long, sometimes persisting after phyllodes have fallen. Phyllodes lanceolate, straight or usually distinctly falcate, (50–)65–100 mm long, (4–)5–9 mm wide, 9.5–14(–18) times longer than wide, 8–13 widely spaced (0.5 mm or more apart) longitudinal nerves, not anastomosing, 1 or usually 2 more prominent than the rest, dense adpressed silvery hairs when young, glabrescent with age, prominent gland with distinct rim at base, mucronulate with thick deciduous mucro 1–2 mm long; pulvinus 2–4 mm long, with indumentum of branchlets. Flowers in interrupted spikes 30–40 mm long, on adpressed pubescent peduncles 2–5 mm long; spikes single or usually in pairs in axils, at the base of a rudimentary shoot which sometimes grows out into a leafy shoot with spikes single in the axils, or with up to 5 spikes on an axillary leafless axis up to 10 mm long; rachis adpressed pubescent; bracteoles brown, ovate, sessile, prominent when spikes very young but deciduous. Flowers 5-merous; calyx cup-shaped, 0.4–0.5 mm long smooth and glabrous except for obtuse fimbriate lobes *c.* 0.1 mm long; corolla 1.2–1.4 mm long, lobed to about the middle, glabrous, lobes with obscure midrib; stamens *c.* 2 mm long; ovary densely pubescent. Pods (immature), narrowly oblong, to 50 mm long and 8 mm wide; valves chartaceous, glabrous. Seeds (immature) obliquely arranged in pod. **Fig. 12.**

***Additional specimens examined*: Queensland.** Cook District: Mt Mulligan, Aug 1990, *Clarkson 8896* (BRI; CNS, DNA, K, PERTH *n.v.*); Mt Mulligan, Apr 1995, *Jago 3411 & Jensen* (BRI); Mt Mulligan, *c.* 2 km S of the mine site along the pipe line leading to the falls on Richards Creek, Apr 1984, *Clarkson 5249* (BRI; CNS, DNA, K, MEL, NSW, PERTH *n.v.*); Mt Mulligan, *c.* 40 km NW of Dimbulah, top of mountain, *c.* 0.5km SE of dam, Apr 1985, *Clarkson 5770* (BRI; CNS, DNA, MEL, MEL, NSW *n.v.*); Mt Mulligan, summit on slopes above Richards Creek downstream from dam, Apr 1985, *Clarkson 5839* (BRI; CNS, K, MEL, NSW, PERTH *n.v.*); Mt Mulligan, the Pepper Pot, Apr 1985, *Clarkson 5913* (BRI; CNS, DNA, MEL, NSW, PERTH *n.v.*).

***Distribution and habitat*:** *Acacia ammitia* is restricted to Ngarrabullgan (Mt Mulligan) – a mesozoic sandstone massif, some 60 km WNW of Mareeba in north-east Queensland, where it occurs in an open woodland dominated by *Corymbia leichhardtii* (F.M.Bailey) K.D.Hill & L.A.S.Johnson, *Eucalyptus cullenii* Cambage and *E. cloeziana* with a *Triodia* understorey, invariably on sandstone rock pavements, steep rocky slopes above cliffs and scree slopes.

***Notes*:** Duplicates of some collections of *Acacia ammitia* have been previously distributed as *A. leptostachya* Benth., which in general appearance it resembles, while its pods are similar to those of *A. hammondii* Maiden. However, it is probably more closely related to *A. pubirhachis*. The widely spaced longitudinal nerves of the phyllodes distinguish it from all other juliflorous species with small phyllodes.

Ngarrabullgan (Mt Mulligan) hosts several vascular plant endemics, namely *Boronia montimulliganensis* Duretto, *Hibbertia mulligana* S.T.Reynolds, *Labichea mulliganensis* A.R.Bean, *Plectranthus minutus* P.I.Forst. and *Prostanthera mulliganensis* B.J.Conn & T.C.Wilson. These plants are all small shrubs or subshrubs (low

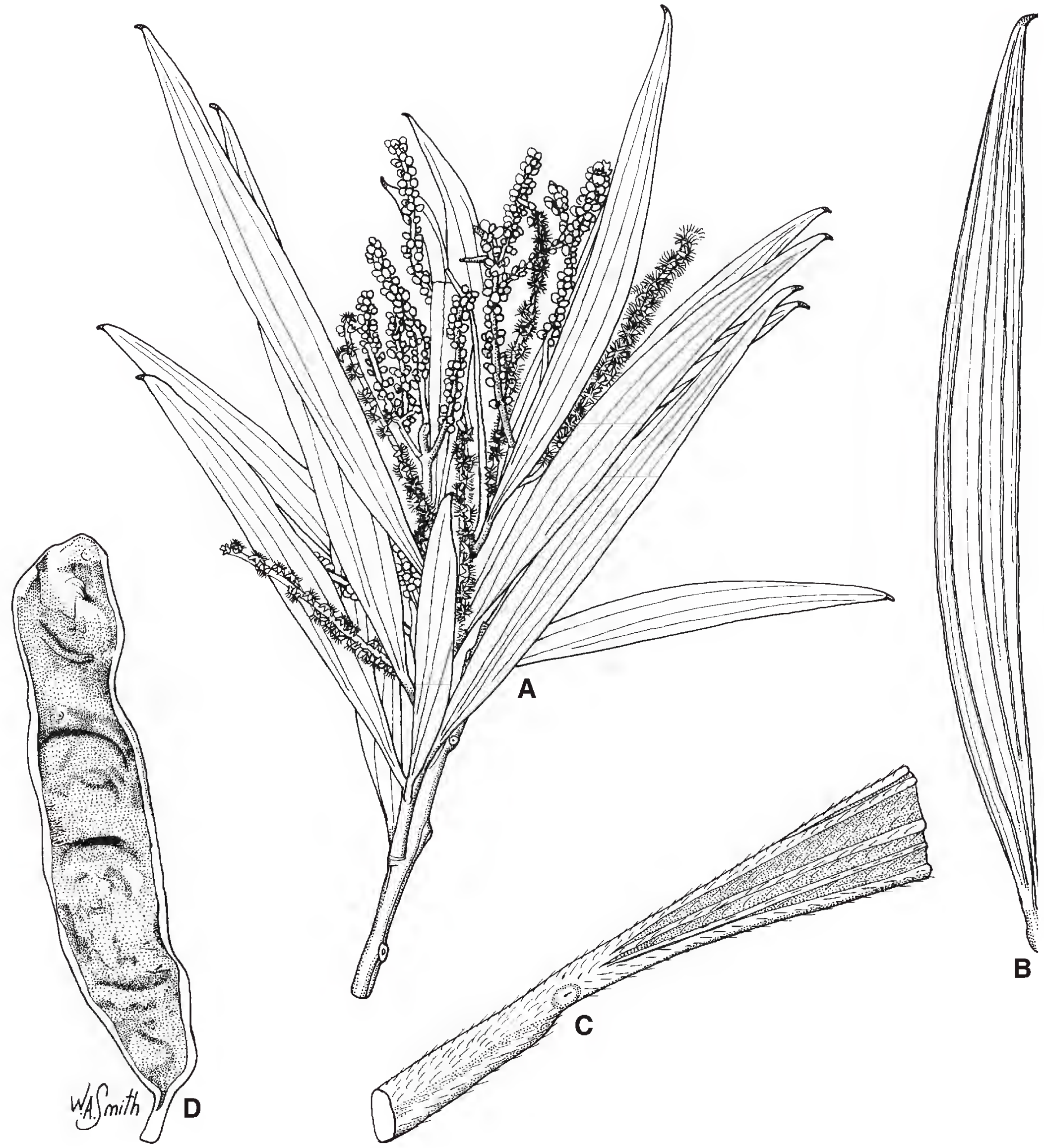

Fig. 12. ***Acacia ammitia***. A. habit of twig with phyllodes and inflorescences ×1.2. B. phyllode ×2. C. proximal end of phyllode showing gland ×8. D. pod ×2. A–C from *Clarkson 5913* (BRI); D from *Clarkson 8896* (BRI). Del. W. Smith.

bushes), whereas *Acacia ammitia* is currently the only endemic large shrub or small tree.

***Etymology*:** The specific epithet is derived from Greek *ammites* "sandstone", with suffix *-ia* "characteristic of", a reference to the habitat of the species.

Acacia dichromotricha Pedley **sp. nov.** affinis *A. sparsiflorae* Maiden et *A. pubirhachi* Pedley autem ab illa rhachide spicae dense pubescente, lobis calycis plus profunde lobatis, nervis phyllodii plus crebris et ab hac ramulis pilis adpressis obsitis non dense villosis, phyllodiis certe falcatis non plus minusve rectis carentibus prominentes longitudinales nervos, spicis sparsifloris rachide pilis aureis non albis, floribus aliquantum parvioribus differt. **Typus:** Queensland. Gregory North District: 'Rangelands', 15 km N of Winton, 7 May 1999, *B. Wilkinson AZI1581* (holo: BRI).

Acacia sp. (Fermoy Road I.V. Newman 487); Holland & Pedley (2002: 114); CHAH (2006); Pedley (2007: 114; 2010: 109; 2017); Silcock & Fensham (2014); Silcock *et al.* 2014).

Tree to 15 m tall; bark furrowed. Branchlets reddish, angular with yellowish ribs on angles, densely adpressed white hairs, becoming glabrous. Phyllodes linear to narrowly elliptic or oblanceolate, strongly falcate, 9–12 cm long, 4.5–7 mm wide, 10–25 times longer than wide, densely adpressed pubescent when young, hairs restricted to base when old, longitudinally striate with close longitudinal nerves (14–15 per mm), one or three sometimes somewhat more prominent than rest, marginal nerve prominent; tapered into pulvinus 1.5–2.5 mm long; gland prominent, basal or up to 2.5 mm from base. Flowers in interrupted spikes 25–40 mm long on peduncles 1–3 mm long, in pairs in upper axils, concave brown deciduous bract *c.* 1.5 mm long at base of peduncle, occasionally minute axis bearing spikes growing out into leafy shoot, peduncles and rachis pubescent with dense golden-yellow matted and ascending hyaline hairs *c.* 0.2 mm long. Flowers 4- or 5-merous; bracteoles ± sessile, concave, obtuse, *c.* 0.4 mm long, golden pubescent on back; calyx saucer-shaped, *c.* 0.5 mm long, lobed to about the middle, the lobes wide, obtuse, golden pubescent, hairs sometimes absent from base; corolla 1.3–1.5 mm long, lobed to about the middle, glabrous except for a few long ascending hairs on free part; stamens 2–2.2 mm long; ovary with indumentum of dense short thick hairs. Pods and seeds not seen. **Figs. 13–15.**

***Additional specimens examined* (all BRI): Queensland.** Gregory North District: 'Rangelands' *c.* 20 km from Winton on road to Hughenden, Jun 2000, *Johnstone s.n.* [AQ668037]; 'Rangelands', Jun 2002, *Milson A211617*; Scrammy Gorge, Bladensberg NP, Jun 2006, *Cumming 24300*. Gregory South District: Stoneleigh Outstation, northern section of 'Thylungra', Aug 2010, *Silcock JLS682*; In vicinity of Stoneleigh Outstation, 'Thylungra', Aug 2011, *Silcock JLS994*. Mitchell District: 'Noonbah', Jun 1989, *Voller s.n.* [AQ457758]; Stonehenge Nature Drive, Stonehenge, Jun 2002, *Melzer RM1482*; S of Winton on 'Fermoy' road, Jun 1971, *Newman 487* (ex NSW); Yang Yang Range, *c.* 3 km S of 'Yaraka', May 2010, *Silcock JLS637*; SE Corner of 'Budgerygar', S of Powell Creek, Jun 2015, *Silcock JLS1685 & McDermott*.

***Distribution and habitat*:** *Acacia dichromotricha* occurs in central western Queensland where it is endemic to an area between *c.* 20 km north of Winton to *c.* 20 km south-east of 'Budgerygar' homestead with eight populations recorded that are supported by herbarium vouchers. Silcock & Fensham (2014) indicated that the species occurred in 25 populations with an estimated 750,000+ individuals.

Plants grow in skeletal reddish soils characteristic of the lateritic plateaux in this area, in association with open woodland dominated variously by *Acacia aneura*, *A. catenulata* C.T.White, or *Corymbia blakei* subsp. *rasilis* K.D.Hill & L.A.S.Johnson, and numerous shrub species from the genera *Dodonaea* and *Eremophila*.

***Notes*:** *Acacia dichromotricha* is related to *A. sparsiflora* and *A. pubirhachis*. It is distinguished from the former in having the rachises of the spikes densely pubescent, more deeply lobed calyxes and phyllodes with more crowded longitudinal nerves, and from the latter in its branchlets with adpressed hairs, interrupted spikes with hairs of the rachis yellow rather than white, and somewhat smaller flowers.

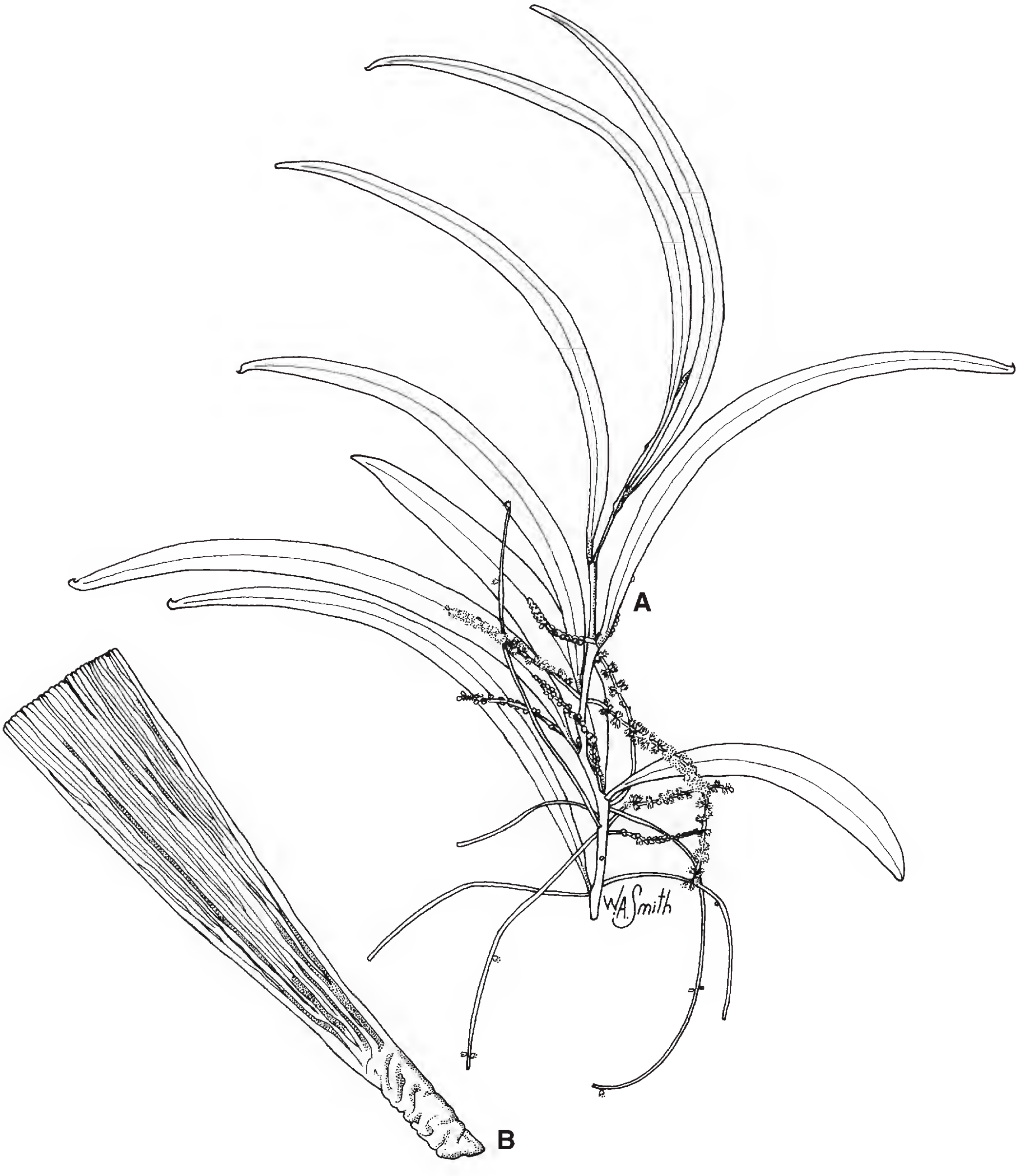

Fig. 13. ***Acacia dichromotricha***. A. habit of twig with phyllodes and inflorescences ×0.8. B. proximal end of phyllode ×6. All from *Cumming 24300* (BRI). Del. W. Smith.

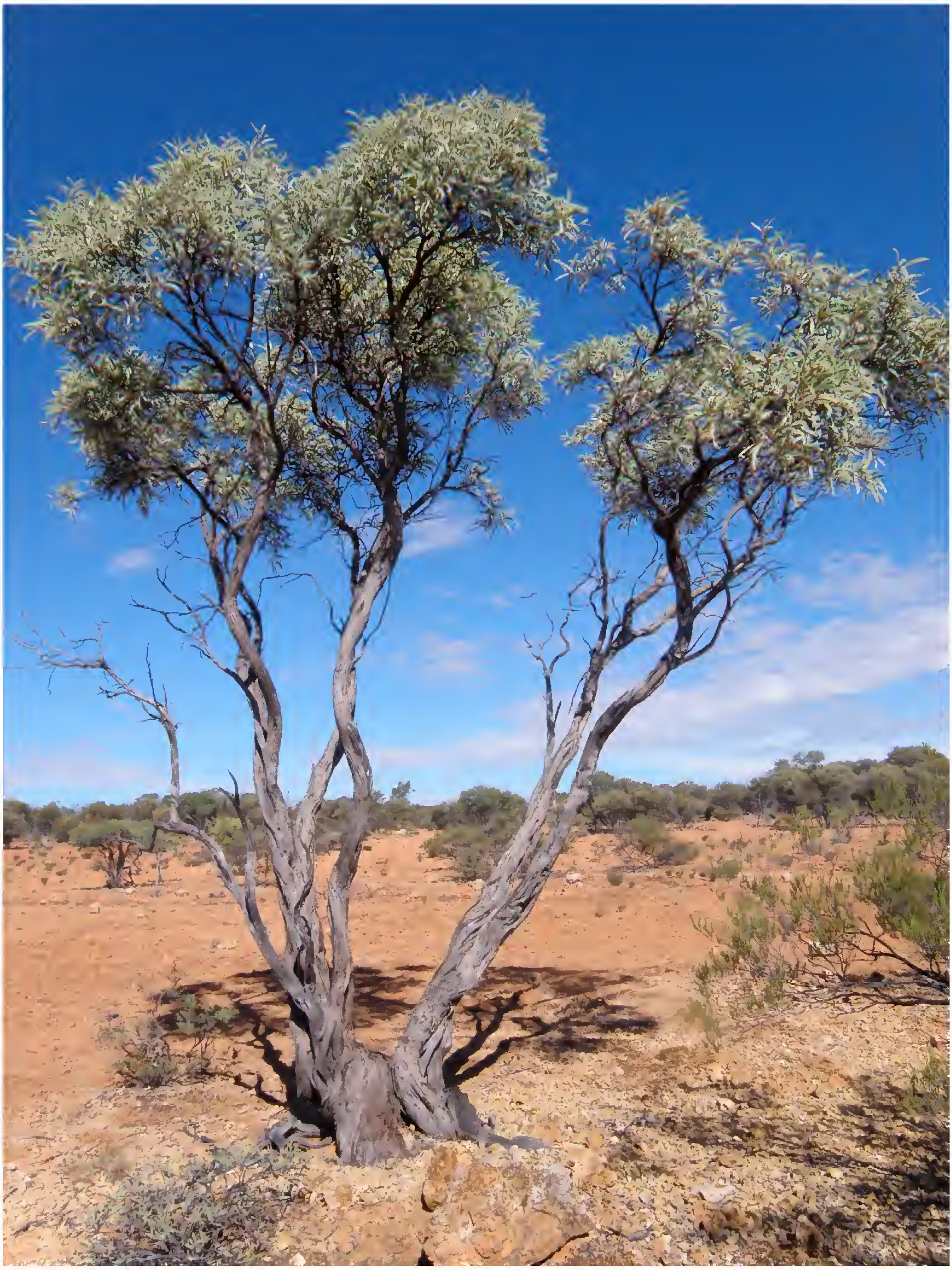

Fig. 14. Adult of ***Acacia dichromotricha*** (population voucher: *Silcock JLS1685 & McDermott*, BRI). Photo: J. Silcock.

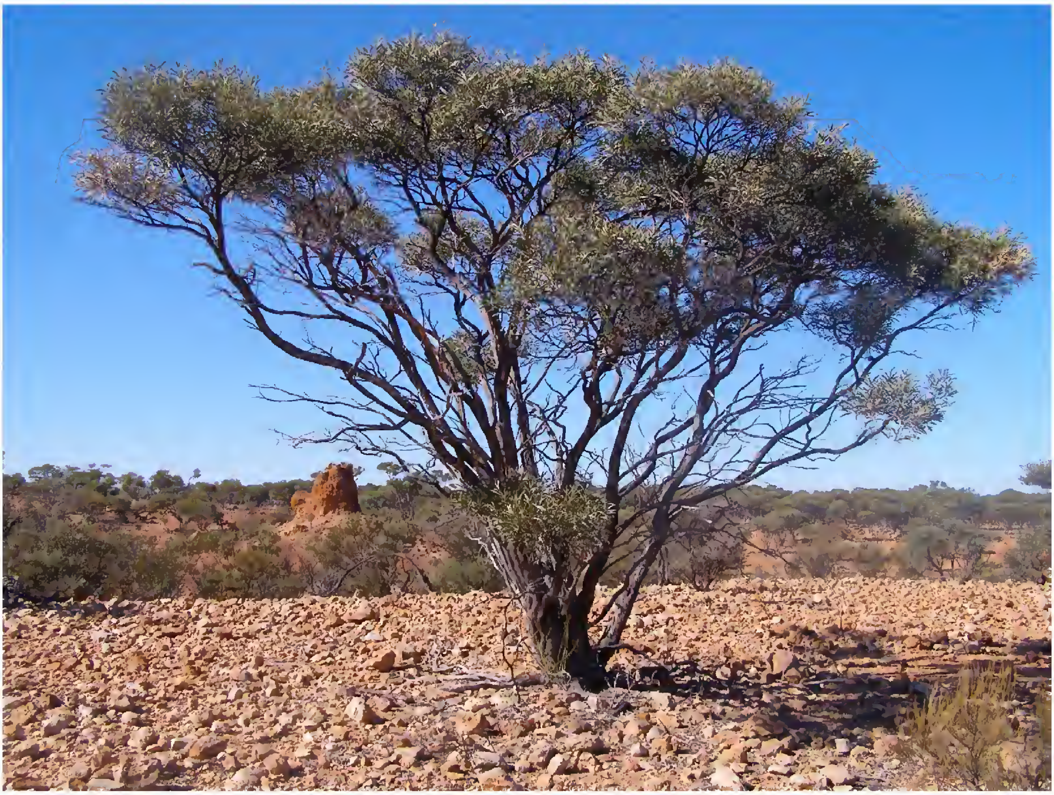

Fig. 15. Adult of ***Acacia dichromotricha*** (population voucher: *Silcock JLS994*, BRI). Photo: J. Silcock.

***Etymology*:** The specific epithet is derived from the Greek, prefix *di-* “two”, *chroma* “colour” and “*tricha*” hair. The hairs of the young branchlets are white, while those of the spike-rachises are golden yellow.

Acknowledgements

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A taxonomic revision of Sapotaceae for mainland Australia

L.W. Jessup

Summary

Jessup, L.W. (2019). A taxonomic revision of Sapotaceae for mainland Australia. ***Austrobaileya* 10(3): 321–382.** A taxonomic account of Sapotaceae for mainland Australia is provided along with descriptions and keys to the genera and species of native and naturalised taxa of the family. Australia has ten genera (*Amorphospermum* F.Muell., *Donella* Pierre ex Baillon, *Manilkara* Adans., *Mimusops* L., *Niemeyera*, *Palaquium* Blanco, *Planchonella* Pierre, *Pleioluma* (Baill.) Baehni, *Sersalisia* R.Br., *Van-royena* Aubrév.) with 36 native species, including one subspecies and one variety, and one introduced and naturalised genus (*Chrysophyllum* L.) with two species.Three new species from Queensland are described and illustrated: *Pleioluma ferruginea* Jessup, *P. pilosa* Jessup and *Niemeyera discolor* Jessup, and two new combinations made, *Planchonella myrsinifolia* subsp. *howeana* (F.Muell.) Jessup and *Sersalisia obpyriformis* (F.M.Bailey) Jessup. Lectotypes are chosen for the names *Achras brownlessiana* F.Muell., *A. xerocarpa* F.Muell. ex Benth. and *Bassia galactoxyla* F.Muell. and a neotype for *Lucuma obpyriformis* F.M.Bailey.

Key Words: Sapotaceae; Australia flora; *Amorphospermum*; *Chrysophyllum*; *Donella*; *Manilkara*; *Mimusops*; *Niemeyera*; *Niemeyera discolor*; *Palaquium*; *Planchonella*; *Planchonella myrsinifolia* subsp. *howeana*; *Pleioluma*; *Pleioluma ferruginea*; *Pleioluma pilosa*; *Sersalisia*; *Sersalisia obpyriformis*; *Van-royena*

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Introduction

The taxonomy of the family Sapotaceae at the level of genus and above has for a long time been the subject of much disagreement, mainly due to morphological character variation. Pennington (1991) summarised the taxonomic history of the family which included work by Lam (1925, 1939), Baehni (1942, 1965), van Royen (1957), Herrmann-Erlee & van Royen (1957), Vink (1958) and Aubréville (1964). Pennington (1991) collaborated with others who examined and reviewed the cytology, palynology and chemistry of a significant representative cross section of the family and presented a classification of the family based on five tribes and 53 genera. More recent phylogenetic analyses using molecular data have shown that morphological homoplasy is common throughout the family but analyses using both molecular data and selected morphological characters (Anderberg & Swenson 2003; Swenson & Anderberg 2005) have identified three subfamilies, two of which, the *Sapotoideae* Eaton and the *Chrysophylloideae* Luerss., are represented by species in Australia. The *Sapotoideae* are represented by the genera *Mimusops* L. and *Manilkara* Adans. in the tribe *Sapoteae* Rchb. and *Palaquium* Blanco in the tribe *Isonandreae* Hartog. These are distinguished by the presence of a biseriate calyx (Gautier *et al.* 2013). The *Chrysophylloideae* have been extensively studied in recent years (Swenson *et al.* 2007a, 2007b, 2008a, 2008b, 2013; Triono *et al.* 2007) with the result that several genera in Australia and the Western Pacific (including New Caledonia) have been reinstated following their previous inclusion in *Pouteria* Aubl., a genus of the New World tropics. The Australian representatives of this group include the genera *Planchonella* Pierre, *Pleioluma* (Baill.) Baehni, *Sersalisia* R.Br. and *Van-royena* Aubrév. The genus *Donella* Pierre ex Baillon was reinstated by Mackinder *et al.* (2016) and is recognised here as distinct from New World *Chrysophyllum* L. It was represented as Clade D in Swenson *et al.* (2008b) in their Bayesian majority-rule consensus tree which was based on

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combined sequence data from the chloroplast and nuclear genomes and morphological data. *Amorphospermum* F.Muell. was included in *Niemeyera* by Pennington (1991) and both genera were earlier placed under *Chrysophyllum* by Vink (1958). Based on molecular data, *Amorphospermum* is strongly supported as the sister taxon to *Niemeyera* F.Muell. and is here recognised as a distinct genus, following the work of Swenson *et al.* (2013).

This account is restricted to Sapotaceae that occur on mainland Australia and associated islands, but excludes those found only in Australian territories or Oceanic islands (i.e. *Planchonella costata* (Endl.) H.J.Lam and *P. nitida* (Blume) Dubard), that have been previously covered in *Flora of Australia* accounts by Du Puy (1993) and Green (1994). One subspecies in *Planchonella* (*P. myrsinifolia* subsp. *howeana* (F.Muell.) Jessup) from Lord Howe Island, is however, dealt with here as part of the account for that species.

Materials and methods

This account is based on specimens in herbarium collections in BM, BRI, CANB, CNS (previously QRS), DNA, E, G, K, L, MEL, NSW, P, PERTH and US and some field observations by the author. All specimens cited have been seen by the author or in a few cases as high resolution images. Descriptions of flowers were prepared from material preserved in FAA or 70% alcohol and glycerol or reconstituted by briefly boiling in water. The descriptions of fruit were prepared from both dried and alcohol preserved material. The seed length is measured in the same direction as the fruit length i.e., from the basal or pedicel end to the stylar end, next the seed width is measured from the adaxial or ventral surface to the abaxial or dorsal surface and this is followed by the width at right angles to the other two.

Common abbreviations in the specimen citations are FR (Forest Reserve), LA (Logging Area), Mt (Mountain), NP (National Park), SFR/SF (State Forest Reserve/State Forest), TR (Timber Reserve). Apart from types, only additional specimens from the Australian occurrence of non-endemic species are cited. Rainforest typology largely follows the classification scheme of Webb (1978).

Bibliographic information pertaining to generic synonyms that have not been applied to Australian taxa can be sourced in Govaerts *et al.* (2001). Vernacular names that are commonly listed for taxa (e.g. Francis 1951; Harden *et al.* 2013) are provided where there is clear application.

Taxonomy

Sapotaceae A.Juss., *Gen. Pl.* 151 (1789).

Trees or shrubs with latex. Indument of 2-branched hairs, variously prostrate to erect. Leaves alternate or (not in Australia) opposite, coriaceous or subcoriaceous, mostly entire; venation (in Australia) mostly brochidodromous or eucamptodromous, or a combination of the two; stipules present or absent. Flowers solitary or in axillary cymose fascicles, rarely paniculate, regular, hypogynous, often bracteolate; sepals (4–)5(–12), (imbricate) usually quincuncial, or sometimes in 2 cycles of 2, 3, or 4; corolla sympetalous, with 4–8 imbricate lobes; stamens epipetalous, in 1–3 whorls, staminodes present or absent; anthers with longitudinal slits, extrorse; gynoecium of 2–14 (–30) carpels, syncarpous, ovary plurilocular with axile or axile-basal placentation; style single, undivided, frequently with small stigmatic surfaces at the tip or simple without visible stigmatic areas; ovules 1 per carpel, anatropous to hemitropous, apotropous. Fruit a fleshy or sclerenchymatous berry; seeds with a shiny and usually thick and hard testa and a small basal or larger lateral scar of attachment (hilum) which may be narrow and elongate or broad and extending over much of the seed surface and extending from less than 80% to 100% of the seed length; embryo large, with exserted radicle, thin and flat cotyledons, enclosed in a well-developed, oily, fleshy or hard endosperm, or with included radicle, thickened cotyledons and without endosperm at maturity. $x = 7, 9–13$.

The family includes approximately 60 to 80 genera and at least an estimated 1300 described species (Swenson, pers. comm.; Faria *et al.* 2017), widespread in tropical and subtropical parts of both the Old and the New World. Australia has ten genera with 36 native species, including one subspecies and one variety, and one introduced and naturalised genus (*Chrysophyllum*) with 2 species. The genera are arranged by subfamily and tribe in this account to emphasize the morphological characters defining these groups. An overall key to genera based primarily on floral characters is provided.

Key to Subfamilies of Sapotaceae in Australia

1 Calyx biseriate in 2 whorls of 2–4 sepals; corolla lobes divided . . . . **Subfam. Sapotoideae**
1. Calyx a single whorl of 4, 5 or 6 sepals; corolla lobes and stamens mostly same number as sepals (up to 8 in *Amorphospermum*); corolla lobes undivided . . . . **Subfam. Chrysophylloideae**

Key to genera of Sapotaceae in Australia

1 Calyx biseriate; stipules frequently present. **2**
1. Calyx uniseriate; stipules absent **4**

2 Staminodes present; corolla a single whorl, lobes usually with appendages or divided into segments **3**
2. Staminodes absent; corolla lobes without appendages or distinct segments . . **3. Palaquium**

3 Sepals 8 in 2 whorls; corolla lobes 8, each divided into 3 segments; stamens and staminodes 8 each, pilose; seed scar circular or elliptic . . . . **1. Mimusops**
3. Sepals usually 6 in 2 whorls; corolla lobes usually 6 and divided to the base into 3 segments; stamens and staminodes usually 6 each, staminodes glabrous; seed scar elongate . . . . **2. Manilkara**

4 Corolla with spreading, recurved or revolute lobes; stamens exserted; style without discrete stigmatic areas. **5**
4. Corolla with more or less erect lobes; stamens included; style with more or less discrete stigmatic areas **6**

5 Venation eucamptodromous; tertiary leaf venation oblique between secondaries or from a secondary vein running more or less perpendicular to the midvein; quaternary venation reticulate and mostly visible below; seed testa papery . . . . **4. Niemeyera**
5. Venation brochidodromous, tertiary leaf venation descending from margin, parallel to secondary veins; quaternary venation ± obscured below by persistent indumentum; seed testa woody or bony . . . **5. Amorphospermum**

6 Staminodes present, each inserted at the sinus between the corolla lobes **7**
6. Staminodes absent. **10**

7 Tertiary and higher order venation finely areolate (**Fig. 1**). **8**
7. Tertiary venation often parallel to and reticulate between secondary veins, never areolate (**Fig. 2**) **9**

8 Stamens inserted at or below the middle of the corolla tube; cotyledons foliaceous, endosperm present . . . . **7. Pleioluma**
8. Stamens inserted in or just below the corolla tube orifice; cotyledons plano-convex, endosperm absent . . . . **9. Sersalisia**

9 Stamens inserted near middle of corolla tube . . . . **6. Van-royena**
9. Stamens inserted above the middle of the corolla tube and usually just below the corolla tube orifice . . . . **8. Planchonella**

10 Leaves glabrescent to glabrous below; stamens inserted in the lower half of the corolla tube . . . . **10. Donella**
10. Leaves densely and permanently rufous-tomentose below; stamens inserted at the top of the corolla tube . . . . **11. Chrysophyllum**

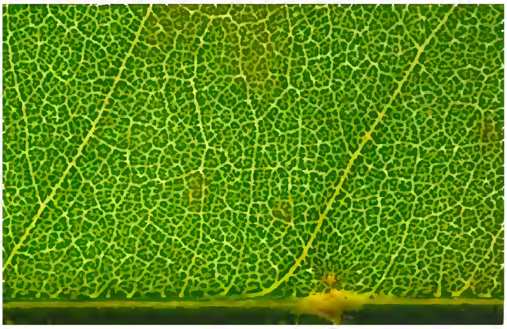

Fig. 1. Areolate tertiary and higher order venation in ***Pleioluma queenslandica*** (no voucher).

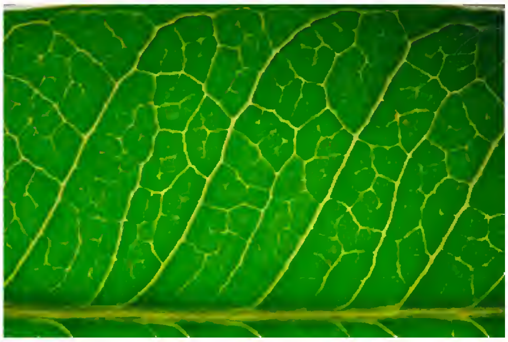

Fig. 2. Parallel and reticulate tertiary venation in ***Planchonella australis*** (no voucher).

Subfamily Sapotoideae Eaton, *Bot. Dict.*, ed. 4: 35 (1836).

Tribe Sapoteae Rchb., *Handb. Nat. Pfl.-Syst.* 214 (1837).

Calyx of 2 whorls of 2, 3 or 4 free sepals; corolla lobes divided; stamens 6, 8 or 12; staminodes present.

1. MIMUSOPS

Mimusops L., *Sp. Pl.* 349 (1753). **Type species:** *M. elengi* L. (lecto: *fide* Britton & Millspaugh 1920: 324).

Trees or shrubs. Leaves spirally arranged; venation brochidodromous; stipules often present, caducous. Flowers bisexual, axillary, solitary or fasciculate. Calyx of 2 whorls of 4 free sepals, the outer whorl valvate. Corolla tube much shorter than the corolla lobes; lobes 8, divided to the base into 3 segments; median segment clasping the stamen, sometimes inflexed against the style; lateral segments spreading, entire or deeply divided. Stamens (7–)8, in a single whorl, inserted at top of corolla tube; filaments free or partially fused to the staminodes; anthers extrorse. Staminodes 8, alternating with the stamens, inflexed and often forming an envelope round the gynoecium. Ovary (7–)8-locular, style exserted or not. Fruit with 1 to several seeds, seed scar small, basal, often circular or elliptic. Cotyledons foliaceous, radicle exserted, endosperm copious.

The genus consists of about 20 species in Africa, 15 in Madagascar, four in the Mascarenes, one in the Seychelles, and one in Asia, the Pacific Islands and Australia.

Mimusops elengi L., *Sp. Pl.* 349 (1753). **Type:** not designated.

Mimusops parvifolia R.Br., *Prodr. Fl. Nov. Holland.* 531 (1810); *M. elengi* var. *parvifolia* (R.Br.) H.J.Lam, *Bull. Jard. Bot. Buitenzorg*, sér. 3, 7: 236 (1925). **Type:** [Queensland. COOK DISTRICT]: Carpentaria, Coen River [Pennefather River], 6 November 1803, *R. Brown* [*Bennett no. 2826*] (syn: BM); North Coast, East Coast, *s.dat.*, *R. Brown s.n.* (syn: E, K, P).

***Illustrations*:** Cooper & Cooper (2004: 506); Hyland *et al.* (2010).

Shrubs or trees to 25 m. Twigs tomentose. Leaves with petiole 10–20(–25) mm long, tomentose; lamina elliptic or oblanceolate, 3–10 cm long, 1.6–6 cm wide, apex acuminate, obtuse or acute, base shortly attenuate or acutely cuneate, glabrous above, glabrescent or persistently hairy below; midvein raised above leaf blade; secondary veins 10–20 pairs. Flowers in fasciculate inflorescence; pedicel 7–20 mm long, reddish-brown tomentose. Sepals lanceolate or narrowly triangular, 7–9 mm long, acute, on outside densely tomentose, on inside tomentose and glabrous towards base. Corolla lobes triangular (each lobe divided to the base into 3 triangular lobes), 5.5–8 mm long, acute, entire. Stamens 8, 5–7 mm long. Staminodes linear. Ovary pilose; style terete, 5–6.5 mm long, glabrous. Fruit broadly ovoid, glabrous or nearly so, fleshy, 1.5–2.2 cm long, 1.5–1.8 cm wide. Seeds 1–2(–3), ellipsoid, compressed, 13–14 mm long, 8.5–9.5 mm wide, 6–7 mm thick; testa brown.

***Additional selected specimens examined*:** **Western Australia.** 7 km SW of Martins Well, Dampierland, N of Broome, Apr 1977, *Kenneally 6184* (PERTH); Dampier Peninsula, Ilan (between Gnamagun Mill and coast), Jun 1984, *Forbes 2452 & Kenneally* (BRI, L); Bathurst Island, Buccaneer Archipelago, W Kimberley coast, Aug 1982, *Kenneally 8507* (CANB, PERTH); Eastern Walcott Inlet, West Kimberley, May 1983, *Milewski 72* (BRI); Cape Leveque, Gnamagan Well, Apr 1988, *Dunlop 7803* (BRI). **Northern Territory.** Channel Island, Darwin Harbour, Feb 1972, *Byrnes 2371* (BRI, CANB); Gunn Point, Jan 1985, *Wightman 1800* (BRI, CANB, K); Murgenella area, 3 km NW of Laterite Point, Oct 1987, *Dunlop 7122* (BRI, MEL); Crocodile Creek, Gove Peninsula, Feb 1988, *Russell-Smith 4656 & Lucas* (BRI); Marchinbar Island, Wessel Islands, Dec 1987, *Russell-Smith 4456 & Lucas* (BRI, MEL). **Queensland.** COOK DISTRICT: Portland Roads, Jan 1982, *Hyland 11547* (BRI); Turrel Hill, Macrossan Range, Silver Plains, Jun 1998, *Forster PIF23086 et al.* (BRI); 0.5 km from Lakeland Downs to Cooktown Road, on road to Helenvale, Mar 1987, *Clarkson 6777 & McDonald* (BRI); Wangetti Beach FR, Jan 2009, *Costion 1598* (BRI). NORTH KENNEDY DISTRICT: Cape Cleveland NP, Feb 1992, *Forster PIF9662 & Bean* (BRI); Bowen golf links, Mar 1983, *Anning A579* (BRI). SOUTH KENNEDY DISTRICT: R60 Ossa, Cape Hillsborough, May 1975, *Hyland 4281RFK* (BRI); Lindeman Island, Nov 1985, *Batianoff 3324 & Dalliston* (BRI); Calder Island, 60 km NE of Mackay, May 1992, *Halford Q1227 & Crombie* (BRI); Turtle Bay, Carlisle Island, 35 km N of Mackay, Sep 1986, *Sharpe 4402 & Batianoff* (BRI). PORT CURTIS DISTRICT: W Coast of Shoalwater Bay, near Mooly Creek, Apr 1945, *Blake 15596* (BRI); Shoalwater Bay Training Area, site SW02, 10 km SE of Sabina Point, Sep 1993, *McDonald 5668 & Melzer* (BRI).

***Distribution and habitat*:** *Mimusops elengi* occurs across coastal, tropical northern Australia from north of Broome, Western Australia, to north of Shoalwater Bay, Queensland (**Map 1**). It is found in coastal vine thickets, gallery forests and near mangroves. It also occurs in Asia, Malesia and on Pacific islands.

***Phenology*:** Flowers have been recorded from October to June, and fruit from May to October.

2. MANILKARA

Manilkara Adanson (*nom. cons.*), *Fam. Pl. (Adanson)* 2: 166 (1763). **Type:** *M. kauki* (L.) Dubard.

Shrubs or trees. Leaves spirally arranged; venation brochidodromous; stipules absent or present (not in Australia). Flowers mostly bisexual, axillary. Calyx of two whorls of (2–)3(–4), free or shortly united sepals. Corolla lobes 6(–9, not in Australia), usually divided to near the base into 3 segments; median segment usually erect, sometimes clawed, clasping the stamen; two dorso-lateral segments erect or spreading, entire or divided. Stamens 6(–12, not in Australia) in a single whorl usually inserted at top of corolla tube; filaments free or partially fused with the staminodes, anthers extrorse. Staminodes usually present and alternating with stamens, usually erect and divided in one way or another at apex. Disk annular, small or absent. Ovary 6–8(–14)–locular, style exserted. Fruit 1–several-seeded; seed scar elongate, basiventral. Cotyledons foliaceous, radicle exserted; endosperm copious.

A pantropical genus of 30 species in America, *c.* 20 species in Africa and Madagascar and *c.* 15 species in Asia and the Pacific, and two species in Australia. The Asian-Pacific species of the genus have recently been revised by Armstrong (2013).

Key to species of *Manilkara* in Australia

1 Lamina appressed tomentose on underside; sepals 6–7.5 mm long; style 8–9.5 mm long; fruit 2.5–3.7 cm long, 1.8–3.3 cm wide . . . . **1. M. kauki**
1. Lamina glabrous; sepals 8.5–12 mm long; style 13–16 mm long; fruit 5–6 cm long, 4–4.5 cm wide . . . . **2. M. kanosiensis**

1. Manilkara kauki (L.) Dubard, *Ann. Mus. Colon. Marseille* ser.3, 3: 9 (1915); *Mimusops kauki* L., *Sp. Pl.* 349 (1753). **Type:** “Habitat in Zeylona”, *s.dat.*, *P. Hermann s.n.* (lecto: BM, image!; *fide* Trimen 1895: 87).

Mimusops kauki var. *browniana* A.DC., *Prodr. Fl. Nov. Holland.* 8: 203 (1844); *Mimusops browniana* (A.DC.) Benth., *Fl. Austral.* 4: 285 (1868). **Type:** New Holland, *s.dat.*, *R. Brown s.n.* (holo: BM).

***Illustrations*:** Lam (1941); Cooper & Cooper (2004: 505); Hyland *et al.* (2010).

Shrubs or trees, to 20 m. Twigs tomentose, glabrescent. Leaves with petiole 5–25 mm long, tomentose or pubescent, channelled above; lamina obovate or broadly elliptic, 3–9 cm long, 2–5.5 cm wide, apex rounded, obtuse or emarginate, base cuneate, glabrescent above, persistently appressed tomentose below; margins slightly recurved; secondary veins 11–20 pairs. Flowers fasciculate; pedicels 15–20 mm long, sericeous or tomentose. Sepals ovate or triangular, 6–7.5 mm long, 3–4.5 mm wide, acute, inner whorl only slightly smaller than outer; appressed tomentose outside, less densely so inside, nearly glabrous at base. Corolla tube 1.5–3 mm long, lobes 4.5–7 mm long, narrowly ovate, oblong or lanceolate. Stamens 6, filaments 2–3 mm long, anthers 2.5–3.7 mm long. Staminodes ovate, acuminate, 3.5–5 mm long, often with dentate margin and bifid at apex. Ovary conical, pubescent; style cylindrical, 8–9.5 mm long, glabrous. Fruit broadly ovoid, ellipsoid or obovoid, 2.5–3.7 cm long, 1.8–3.3 cm wide, glabrous or nearly so, fleshy or dry, mostly with 1–3 seeds. Seeds obovoid, compressed, 16–18 mm long, 12–14 mm wide, 7–10 mm thick, testa light brown.

***Additional selected specimens examined*:** **Queensland.** Cook District: Dauan [Island] SW side, Apr 2003, *Wannan 4036* (BRI); Deliverance Island, Torres Strait, May 1999, *Waterhouse BMW5362* (BRI); Near boat ramp, Stephen Island, Torres Strait, Apr 2005, *Hucks LAH281* (BRI); Coconut Island, Aug 1994, *Wannan 45* (BRI); Sue Island, Oct 1981, *Clarkson 3947* (BRI); Somerset, May 1948, *Brass 18800* (BRI, CANB, K, L); Evans Bay, 26 km NE of Bamaga, Feb 1994, *Fell DGF3897 et al.* (BRI); *c.* 2 km S of first creek N of Vrilya Point, Aug 1981, *Morton AM1435 & Godwin* (BRI); Bolt Head, Temple Bay, Jun 1996, *Forster PIF19330* (BRI); Temple Bay, S of Bolt Head, Sep 2004, *Sankowsky 2523 & Sankowsky* (BRI); Beach, 3 km SSE of Kennedy Hill, ‘Bromley’, Jul 1991, *Forster PIF8924* (BRI, MEL); *c.* 1.5 km N of mouth of Pascoe River, Aug 1991, *Clarkson 9095 & Neldner* (BRI); Restoration Island, 1 km E of Cape Weymouth, Feb 1980, *Clarkson 2953* (BRI); Chili Beach, Jan 1982, *Hyland 11606* (BRI); Bathurst Bay, *c.* 2 km ENE of the Muck River, 13 km SSW of Cape Melville, Jun 1984, *Clarkson 5400* (BRI); Bathurst Bay, Cape Melville NP, N of Cooktown, Jul 1998, *Bean 13689* (BRI); Ingram Island, Jul 1973, *Stoddart 4056* (BRI); Two Isles, Sep 1973, *Stoddart 4628* (BRI); Conical Rock, N of Cape Bedford, May 1984, *Godwin C2534* (BRI); Cooktown, *s.dat.*, *Pollock 10* (BRI).

***Distribution and habitat*:** *Manilkara kauki* occurs from south-east Asia to New Guinea and in Australia from Torres Strait to Cooktown in north Queensland (**Map 2**). The species is found in coastal vineforest, and on coral and sand cays, often near mangroves.

***Phenology*:** Flowers have been recorded from January to May, and fruit from May to December.

***Note*:** A specimen of this species in MEL (*Flecker 9521*) is labelled as being collected from Steven Island (NT), but it appears to be an error and is more likely a specimen collected on Stephens Island, Torres Strait (I. Cowie and J. Clarkson *pers. comm.*).

2. Manilkara kanosiensis H.J.Lam & B.Meeuse, *Blumea* 4: 337 (1941). **Type:** Papua New Guinea. Central Province: Kanosia, 10 February 1935, *C.E. Carr 11237* (holo: L image!; iso: CANB; BM & K image!).

***Illustration*:** Lam (1941).

Trees to 25 m. Twigs glabrescent. Leaves: petiole 8–20(–27) mm long, glabrescent or glabrous, channelled above; lamina obovate, 5–10(–14) cm long, 3–6 cm wide, apex abruptly acuminate, rounded or emarginate, base acutely cuneate, glabrous, margins flat; secondary veins 12–18 pairs. Flowers 1–3, axillary; on pedicels 15–27 mm long, appressed tomentose. Sepals acutely triangular, 8.5–12 mm long, inner sepals slightly smaller than outer, appressed tomentose outside, less densely so inside, nearly glabrous at base. Corolla tube 2–4 mm long, lobes *c.* 6.5 mm long, glabrous, the appendages up to 3.5 mm long with long tapering tip. Stamens 6, filaments 2–3 mm long, anthers 4–4.5 mm long. Staminodes ovate with a thickened base, up to 4 mm long, margin laciniate and dentate. Ovary conical, pubescent; style cylindrical 13–16 mm long, glabrous. Fruit ovoid, 5–6 cm long,4–4.5 cm wide, firmly fleshy with two seeds, glabrous. Seeds ellipsoid or narrowly ovoid, compressed, 27–35 mm long, 14–18 mm wide, 10–11 mm thick, testa brown.

Additional selected specimens examined**: Queensland.** COOK DISTRICT: Near summit of Banks Peak, *c.* 4.5 km NNW of St Pauls village, Moa Island, Torres Strait, Nov 2007, *Fell DGF9166 & Stanton* (BRI); Banks Peak, Moa Island, Torres Strait, Jul 2008, *Fell DGF9721 & Stanton* (BRI); *ibid*, Jul 2008, *Fell DGF9721A & Stanton* (BRI); *ibid*, Jul 2008, *Fell DGF9729 & Stanton* (BRI); Moa Peak, Moa Island, Feb 2010, *Cummings AC1 & AC2* (BRI); *ibid*, Mar 2010, *Cummings AC3 & AC4* (BRI).

Distribution and habitat**:** *Manilkara kanosiensis* occurs in coastal areas of New Guinea, the Tanimbar Islands and in Australia only on Moa Island in the Torres Strait, north Queensland (**Map 2**). It is found in complex evergreen notophyll vineforest.

Phenology**:** Flowers have been recorded in February and March, and fruit in July and December.

Tribe Isonandreae Hartog, *J. Bot.* 16: 69 (1878).

Calyx usually 2 whorls of 2 or 3 sepals; corolla lobes undivided; staminodes absent.

3. PALAQUIUM

Palaquium Blanco, *Fl. Filip. [F.M. Blanco]* 403 (1837). **Type:** *P. lanceolatum* Blanco (lecto: *fide* Merrill 1904: 15, 20).

Bassia L. (1771) (Sapotaceae); *non Bassia* All. (1766) Chenopodiaceae.

Galactoxylon Pierre, *Not. Bot. Sapot.* 6 (1890). **Type:** *G. pierrei* Baillon (lecto: *fide* Baehni 1965: 149).

Trees. Leaves spirally arranged. Lamina with eucamptodromous venation, the secondary veins decreasing to indistinct loops inside the margin. Stipules usually present. Flowers usually bisexual in axillary fascicles. Sepals 6 in 2 whorls, free or shortly connate. Corolla lobes entire, mostly 6, contorted, usually spreading or reflexed and exceeding the length of the tube. Stamens exserted, usually 12 in a single whorl, sometimes (not in Australia) more or fewer and in 2 or 3 whorls; filaments mostly free, inserted in the throat; anthers extrorse. Staminodes absent. Disk usually absent. Ovary (5–)6(–10)-locular; style usually long-exserted, tapering gradually to the apex. Fruit with fleshy pericarp. Seed usually with a broad adaxial scar, without endosperm, cotyledons plano-convex, radicle extending to the surface, or sometimes (not in Australia) seed laterally compressed with a narrow scar, endosperm and foliaceous cotyledons.

A genus of 119 species in Asia, Australia, Malesia and the Pacific (Govaerts *et al.* 2001), one species in Australia.

Palaquium galactoxylon (F.Muell.) H.J.Lam [as *galactoxylum*, *orth. var.*], *Bull. Jard. Bot. Buitenzorg* sér. 3, 7: 107 (1925); *Bassia galactoxyla* F.Muell., *Fragm.* 6: 27 (1867); *Sersalisia galactoxylon* (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 4: 279 (1868); *Lucuma galactoxylon* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 91 (1883); *Galactoxylon pierrei* Baillon, *Hist. Pl. (Baillon)* 11: 300 (1891); *P. galactoxylon* var. *galactoxylon*, P.Royen, *Blumea* 10: 592 (1960). **Type:** Queensland. Rockingham Bay, *s.dat.*, *J. Dallachy s.n.* (lecto [here selected]: MEL 233070).

Palaquium salomonense C.T.White, *J. Arnold Arbor.* 31: 107 (1950); *P. galactoxylon* var. *salomonense* (C.T.White) P.Royen, *Blumea* 10: 592 (1960), **syn. nov. Type:** Solomon Islands. New Georgia, 9 October 1945, *F.S. Walker & C.T. White BSIP180* (holo: BRI).

Illustrations**:** Cooper & Cooper (2004: 508); Hyland *et al.* (2010).

Trees to 47 m high. Twigs tomentose, glabrescent, with leaves conferted at apex. Leaves with petiole (3–)10–16 mm long; lamina narrowly obovate, 7–13.5 cm long, 2.5–5 cm wide, apex obtuse or rounded or emarginate or bluntly acuminate; secondary veins 8–12(–16) pairs. Flowers in axillary clusters of 2–4 along up to 3 mm long brachyblasts; pedicels 6–7 mm long, reddish brown tomentose. Sepals ovate, 1.8–2.5 mm long, obtuse or rounded, ferruginous tomentose on outside, glabrous inside. Corolla lobes narrowly ovate or triangular, 4–4.5 mm long, rounded or obtuse at apex, fimbriate. Stamens 12, 1.7–2.2 mm long, equal or slightly unequal in length; filaments subulate, 1–2 mm long, glabrous; anthers sagittate, oblong or tapering, mostly with some reddish-brown hairs. Ovary cylindrical or broadly conical, *c.* 1.5 mm long, pilose; style soon terete and elongating to 11.5–12.2 mm long. Fruit broadly ellipsoid, 3–3.5(–4) cm long, 1.2–2.5(–3) cm wide, pericarp whitish, glabrous or nearly so; 1 or 2-seeded. Seeds ellipsoid, compressed, 20–25 mm long, 12–20 mm wide, 13–17 mm thick; testa brown or yellowish, shining part covering most of the seed. *Pencil cedar, Daintree maple.*

Additional selected specimens examined**: Queensland.** Cook District: Long Scrub, Bamaga at tip of Cape York Peninsula, in 1962, *Webb & Tracey 6931* (BRI); Lake Boronto, Newcastle Bay, Cape York Peninsula, Sep 1974, *Tracey 14330* (BRI); Claudie River, Jun 1972, *Irvine 222* (BRI, L); Nesbit River floodplain, Silver Plains, Jun 1998, *Forster PIF23034 et al.* (BRI); Mt Webb – Starke Station, Sep 1974, *Tracey 14422* (BRI); TR 165 Monkhouse, Shipton LA, Apr 1984, *Hyland 12945* (BRI, CNS); Foothills near Cape Tribulation, Oct 1971, *Webb & Tracey 11441* (BRI); JCU Canopy Crane plot, Dec 2009, *Costion 2154* (BRI); Daintree River, Dec 1929, *Kajewski s.n.* (BRI [AQ34251]); Kuranda Range (Lower Lookout), Oct 1973, *Hyland 6906* (BRI); SFR 310 Parish of Gadgarra, Goldsborough LA, Dec 1984, *Gray 3778* (BRI); *ibid*, Dec 1984, *Gray 3781* (BRI); SFR 310, Goldsborough LA, Dec 1984, *Gray 3781* (BRI); *ibid*, Jun 1987, *Gray 4495* (BRI); Wyvuri Holding, Apr 1972, *Hyland 6023* (BRI, L); Council Reserve off Cowley Creek Road, E of Cowley Creek, near Silkwood, Oct 2007, *Ford AF5152* (BRI). North Kennedy District: Jarra Creek, *c.* 15 miles [24 km] due NW of Tully, Nov 1951, *Smith & Webb 5005* [distributed as *4905*] (BRI); North Brook Island, 30 km NE of Cardwell, Dec 1988, *Fell DF1535* (BRI); Mt Bentley, Palm Island, Apr 1998, *Cumming 17168* (BRI).

Distribution and habitat**:** *Palaquium galactoxylon* occurs in Papua New Guinea, Solomon Islands and in Australia in north Queensland from Bamaga to Palm Island (**Map 3**). It is found in mesophyll and notophyll vineforest.

Phenology**:** Flowers have been recorded from April to July, and fruit in November and December.

Typification**:** Dallachy originally sent only fruiting material to Mueller and the protologue refers only to fruit. It is for this reason that I have chosen MEL 233070 as lectotype. However, mounted on the sheet MEL 233071 on the lower right hand side is a label dated December 1866 which predates publication of the protologue and was most likely sent with the original fruiting collection. The label on the lower left hand side of MEL 233071 was written by Dallachy and refers to his shooting down flowers and therefore accompanied a later collection that was not available to Mueller when he wrote his description. Mounted directly above this label is a branchlet with a single flower attached. A packet on the same sheet contains some fruit which may also belong with the original collection.

Notes**:** Cooper & Cooper (2004: 508) describe the fruit as 30–40 mm long and the seed as 25–35 mm long with the hilum scar covering half the seed.

The taxon *Palaquium galactoxylon* var. *salomonense* (C.T.White) P.Royen was distinguished from Australian material based on petiole length alone, but examination of a range of material at BRI shows this to be quite unreliable. Therefore, the use of the autonym for the Australian material appears unwarranted.

Subfamily Chrysophylloideae Luerss. (as *Chrysophylleae*), *Handb. Syst. Bot.* 2: 946 (1882).

Calyx a single whorl of 4, 5 or 6 sepals; corolla lobes and stamens mostly of the same number as the sepals (up to 8 in *Amorphospermum*); corolla lobes entire; staminodes present or absent.

4. NIEMEYERA

Niemeyera F.Muell. (*nom. cons.*), *Fragm.* 7: 114 (1870); *non Neimeyera* F.Muell., *Fragm.* 6: 96 (1867) (Orchidaceae). **Type:** *N. prunifera* (F.Muell.) F.Muell., (*nom. cons.*).

Trees or shrubs. Stipules absent. Leaves spirally arranged; venation eucamptodromous (secondary veins gradually decreasing apically inside the leaf margin), tertiary venation horizontal or oblique, or a combination of the two. Flowers fasciculate, axillary, pedicel with bracts at base, bisexual, isomerous. Calyx a single whorl of 5 quincuncial sepals. Corolla with 5 revolute lobes as long as the tube or slightly longer, entire, glabrous. Stamens 5, inserted opposite each corolla lobe at the tube orifice, glabrous, filaments well-developed, free, anthers dorsifixed, shortly calcarate. Staminodes absent. Disk absent. Ovary 5-locular; placentation axile. Style terete or slightly tapered, longer than ovary, without visible stigmatic areas. Fruit a 1 or 2-seeded berry. Seed ellipsoid to globose, not laterally compressed; seed scar adaxial for full length, covering 60% or more of the seed surface width, testa thin, papery, shining part elliptical or oblong. Embryo with white plano-convex cotyledons; radicle included; endosperm absent.

A genus of four species endemic to Australia. Species previously recorded for New Caledonia have been transferred to *Pycnandra* Benth. (Swenson *et al.* 2013; Swenson & Munzinger 2016).

Key to the species of *Niemeyera*

1 Underside of newly expanded lamina with a dense covering of appressed hyaline trichomes exhibiting a silvery sheen; pedicels 2–2.5 mm long . . . . **3. N. discolor**

1. Underside of newly expanded lamina with pale to reddish brown loosely appressed to erect trichomes; pedicels up to 0.5 mm long **2**

2 Lamina on underside with subpersistent erect or suberect trichomes, glabrescent on older leaves . . . . **4. N. whitei**

2. Lamina on underside with loosely appressed trichomes, glabrescent on most leaves **3**

3 Young stems and underside of newly expanded lamina with nearly straight or slightly curved pale reddish-brown or white appressed trichomes, glabrescent; tertiary veins horizontal or oblique; stamens up to 3 mm long; fruit subglobose or broadly ovoid and ± tapering to the style remnant, 20–25 mm long, 17–25 mm wide . . . . **1. N. chartacea**

3. Young stems and underside of newly expanded lamina with ± tortuous reddish-brown trichomes, often fading with age, glabrescent; tertiary veins mostly oblique; stamens 3 mm long or more; fruit globose with a short abruptly swollen style base, 35–50 mm long, 24–50 mm wide . . . . **2. N. prunifera**

1. Niemeyera chartacea (F.M.Bailey) C.T.White, *Contr. Arnold Arbor.* 4: 87 (1933); *Lucuma chartacea* F.M.Bailey, *Queensl. Fl.* 3: 955, t. XXXIX (1900); *Sersalisia baileyana* Domin, *Biblioth. Bot.* 89: 508 (1928); *Chrysophyllum chartaceum* (F.M.Bailey) Vink, *Blumea* 9: 62 (1958); *Amorphospermum chartaceum* (F.M.Bailey) Baehni, *Boissiera* 11: 103 (1965). **Type:** Queensland. Moreton District: Eumundi, October 1900, *J.F. Bailey s.n.* (lecto: BRI [AQ22599]; *fide* Vink 1958: 63).

***Illustration*:** Harden *et al.* (2013).

Shrubs or trees to 25 m high. Twigs densely tomentose, glabrescent. Leaves with petiole 2–8(–10) mm long; lamina oblanceolate, sometimes elliptic or obovate, (2.5)6–12(14) cm long, (1–)2–4 cm wide, apex acuminate, base cuneate or attenuate, soon glabrescent; secondary veins 6–12 pairs; tertiary venation horizontal. Flowers in axillary or ramal few-flowered fascicles; pedicels 0–0.2 mm long, shortly reddish brown tomentose. Calyx lobes ovate, 1.2–1.5 mm long, obtuse. Corolla lobes broadly ovate, broadly obovate or oblong, 1.6–2.2 mm long. Stamens 5, 2.5–3 mm long. Ovary ovoid or subglobose, pilose, style 3.3–3.6 mm long. Fruit subglobose or broadly ovoid and tapering to the style remnant, 2–2.5 cm long, 1.7–2.5 cm wide, pruinose to black, glabrescent. Seeds 1 or 2, ovoid, 17–20 mm long, 9–11 mm wide, shining part of testa elliptic, 14–16 mm long, 5–8 mm wide. *Smooth-leaved plum.*

***Additional selected specimens examined*: Queensland.** South Kennedy District: Massey Creek, Eungella Range, W of Mackay, Oct 1951, *Smith & Webb 4842* (BRI), (as *4742* on ex-BRI specimens). Wide Bay District: Conondale NP (NP 1100 Kilcoy), Peters Road near Mt Cabinet, Sep 1986, *McDonald 4113* (BRI); Conondales, Sunday Creek Road, Jan 2002, *Forster PIF28106 & Leiper* (BRI); Montville, Blackall Range, Apr 1918, *White s.n.* (BRI [AQ34123]); *ibid*, *s.dat.*, *Shirley s.n.* (BRI [AQ348567]); Mary Cairncross Scenic Reserve, Blackall Range, 3 km SE of Maleny, Oct 2007, *Forster PIF33090 & Smyrell* (BRI). Moreton District: Eumundi, Mar 1894, *Simmonds s.n.* (BRI [AQ22597], K); *ibid*, May 1896, *Simmonds s.n.* (BRI [AQ34134]); *ibid*, Nov 1900, *Bailey s.n.* (BRI [AQ34131]); Brolga NP, W of Woombye, Feb 1990, *Bean 1352* (BRI); McDonald Road, 3 km N of Peachester, Jul 1993, *Bean 6255* (BRI); Mt Glorious, 50 km NW of Brisbane, Jun 1978, *Jessup 125 & Reynolds* (BRI, L); *ibid*, Sep 1978, *Jessup 145 & Reynolds* (BRI); Mt Glorious, Taylor Range, Feb 1973, *Webb & Tracey 11452* (BRI); Summit of D'Aguilar Range near Mt Glorious, Nov 1972, *Lebler & Durrington s.n.* (BRI [AQ8931]).

***Distribution and habitat*:** *Niemeyera chartacea* is endemic to Queensland from the Eungella Range near Mackay to the D'Aguilar Range near Brisbane (**Map 4**) in notophyll vineforest.

***Phenology*:** Flowers have been recorded from September to June and fruits from February and March.

***Typification*:** There is only one collection belonging to the original material, i.e. by J.F. Bailey in 1900. This comprises three sheets, two are in BRI that W. Vink saw and which he selected as the lectotype. The third sheet is in MEL and is an isolectotype (MEL 725955).

2. Niemeyera prunifera (F.Muell.) F.Muell., *Fragm.* 7: 114 (1870); *Chrysophyllum pruniferum* F.Muell., *Fragm.* 6: 26 (1867); *Lucuma prunifera* (F.Muell.) F.Muell., *Sel. Pl. Indust. Cult.* 142 (1872); *Amorphospermum pruniferum* (F.Muell.) Baehni, *Boissiera* 11: 103 (1965). **Type:** Queensland. Rockingham Bay, 2 March 1864, *J. Dallachy s.n.* (lecto: MEL 233076; isolecto: GH 75591, F 65037; *fide* Vink 1958: 64).

***Illustrations*:** Cooper & Cooper (2004: 507); Hyland *et al.* (2010); Harden *et al.* (2013).

Shrubs or trees to 15 m high. Twigs densely felted or tomentose. Leaves with petiole 10–25 mm long; lamina oblanceolate to elliptic, 5–14(–18) cm long, 1.7–5.5(–7) cm wide, apex acuminate to obtuse, base acutely cuneate or shortly attenuate, with pale to reddish brown loosely appressed to suberect trichomes below, glabrescent; secondary veins 6–12 pairs; tertiary venation horizontal near midvein, oblique in the distal part, prominent below. Flowers in axillary or ramal fascicles of up to 20 flowers; pedicels 0–0.2 mm long, reddish brown tomentose. Calyx lobes ovate, 1.2–1.5 mm long, obtuse or rounded. Corolla lobes oblong, 1.5–2 mm long. Stamens 5, 2.5–4 mm long. Ovary subglobose, pilose, style 3.3–3.6 mm long. Fruit globose or depressed globose, with a short swollen style base, 35–50 mm long, 24–50 mm wide, pruinose to purple-black, glabrescent. Seeds 1 or 2, subglobular, 15–20 mm diameter, shining part of testa 16–18 mm long, 11–13 mm wide.

***Additional selected specimens examined*: Queensland.** Cook District: Upper Parrot Creek, Annan River, Sep 1948, *Brass 20304* (BRI, K, L); Daintree River, Dec 1929, *Kajewski 1440* (BRI); *ibid*, Mar 1932, *Brass 2218* (BRI); Mossman River Gorge, Feb 1932, *Brass 2143* (BRI); Mossman Gorge, Aug 1959, *Thorne 22863 & Tracey* (BRI); 7.4 km from Rex highway along Mt Lewis Road, Aug 1995, *Hind 6647 & Hind* (BRI); Head of Robson Creek, 5.8 km past Hoop Pine Triangle, NE end of Tinaroo Falls Dam, Mar 1988, *Forster PIF3938* (BRI); SFR 933, Little Pine LA, Nov 1978, *Gray 1162* (BRI); TR 1230, Boonjie LA, Nov 1976, *Hyland 9167* (BRI, K, L); East Malanda, Atherton Tableland, Sep 1929, *Kajewski 1213* (BRI); Garradunga, Sep 1929, *White 11729* (BRI, K, L); Little Beatrice LA, SF 756 Mt Father Clancy, Nov 1995, *Forster PIF18217 & Spokes* (BRI). North Kennedy District: 6 km along Kirrama Range Road, SF 861, Feb 1996, *Forster PIF18366 & Ryan* (BRI); Hinchinbrook Island, *c.* 2 km NW of Mt Diamantina, Dec 2000, *Kemp TH2570* (BRI); Hinchinbrook Island, Little Ramsay Bay, Aug 1975, *Sharpe 1630* (BRI); 2 km E of Paluma, Jan 1989, *Jackes 8901* (BRI). South Kennedy District: Massey Creek, Eungella Range, W of Mackay, Oct 1951, *Smith & Webb 4772* (BRI) [as *4672* on ex-BRI specimens]. Port Curtis District: Pigeon Scrub, SF 391 Bulburin, 9 km along Dawes Range road, Dec 1995, *Forster PIF18287 et al.* (BRI); Bulburin FR, Dawes Range Road, Pigeon Scrub, Jan 2004, *Forster PIF29889 & Tucker* (BRI); Bulburin NP, Cassilus Creek, Jan 2009, *Forster PIF34942 et al.* (BRI).

Distribution and habitat: *Niemeyera prunifera* is endemic to Australia in eastern Queensland and occurs from the Annan River, south of Cooktown to the Dawes Range, near Gladstone, (**Map 5**) in lowland and upland mesophyll and notophyll vineforest.

Phenology: Flowers have been recorded from September to May; fruit from June to November.

Typification: Mueller cited two collections by Dallachy for this species, the first was collected on 2 March 1864 from Rockingham Bay and the second on 11 August 1866 from Mackay River (now Tully River). The lectotype designated by Vink (1958) was collected on 2 March 1864 and has flowers. The fruit that Dallachy refers to on the label of the 2 March 1864 collection are not with the rest of the material on MEL 233076 and can probably no longer be distinguished from fruit collected in 1866. The label with the Mackay River collection states that there were no flowers and only two fruit. Therefore, all flowering collections from that time must have been collected on 2 March 1864 and are therefore isolectotypes.

In making the combination *Niemeyera prunifera*, Mueller also cited specimens collected at Bellinger River by Moore and Clarence River by Wilcox. These were later referred to *N. whitei* and are cited here under that name.

3. Niemeyera discolor Jessup **sp. nov.** differing from the other three *Niemeyera* species by the underside of the newly expanded lamina having a dense covering of appressed hyaline hairs exhibiting a silvery sheen and by the longer pedicels (2–2.5 mm long compared with 0.5 mm long or less). **Typus:** Queensland. Cook District: State Forest Reserve 143, Kanawarra, Carbine Logging Area, 24 November 1987, *B.P. Hyland 13360* (holo: BRI; iso: CNS).

Chrysophyllum sp. (Mt. Lewis A.K. Irvine 1402); Jessup (1994).

Chrysophyllum sp.; Green (1999).

Niemeyera sp. (Mt. Lewis A.K. Irvine 1402); Jessup (1997, 2002, 2007, 2010, 2015).

Illustrations: Cooper & Cooper (2004: 508); Hyland *et al.* (2010).

Trees to 30 m high. Twigs felted or tomentose, glabrescent. Leaves with petiole 10–25(–30) mm long; lamina oblanceolate or elliptic or obovate, 4–13 cm long, 1.5–5 cm wide, apex acuminate to obtuse, base cuneate or shortly attenuate; discolourous with persistent, appressed pale or hyaline trichomes below giving a silvery sheen, glabrescent with age; secondary veins 7–10 pairs; tertiary venation horizontal near midvein, oblique to laxly reticulate in the distal part, not prominent below. Flowers in axillary or closely packed ramal fascicles; pedicels 2–2.5 mm long, reddish or pale brown sericeous. Calyx lobes ovate or oblong, 3–3.2 mm long. Corolla lobes 5, ovate to oblong, 3–3.5 mm long, rounded or obtuse. Stamens 5, 3.7–4.2 mm long. Ovary ovoid, pilose, style terete, 3.5–4 mm long. Fruit obovoid, broadly ellipsoid or subglobular, 4–6 cm long, 4–5.5 cm wide, glabrous or nearly so. Seed 1, subglobular or broadly ellipsoid and tapering to the stylar end, 30 mm long, 25–30 mm diameter, shining part of testa *c.* 18 mm long and 9 mm wide. **Fig. 3A–E.**

***Additional selected specimens examined*: Queensland.** Cook District: Big Tableland, 27 km SE of Cooktown, Sep 1960, *Smith 11179* (BRI); TR 146 Tableland LA, Jul 1975, *Hyland 8325* (BRI); Cedar Bay, Jan 1973, *Webb & Tracey 13767* (BRI); Cedar Bay NP, Mt Finnigan summit area, Horans Creek, Oct 1999, *Forster PIF25039 & Booth* (BRI); Daintree NP, upper slope of Mt Sorrow walking track, W of Cape Tribulation, Nov 2008, *Ford 5408 et al.* (BRI); VCL Noah, Jun 1975, *Hyland 3198RFK* (BRI); Devils Thumb, NW of Mossman, Dec 1990, *Russell s.n.* (BRI [AQ501366]); Mt Lewis, Carbine Tableland, Dec 2008, *Costion 1593* (BRI); SFR 143 North Mary LA, Dec 1974, *Hyland 3144RFK* (BRI); *ibid*, Apr 1975, *Irvine 1402* (BRI)4434; *ibid*, Jul 1975, *Irvine 1476* (BRI); *ibid*, Sep 1975, *Hyland 8375 & 8376* (BRI); *ibid*, Nov 1981, *Gray 2260* (BRI); *ibid*, Sep 2000, *Ford 2429* (BRI, S); *ibid*, Mar 2001, *Forster PIF27058 et al.* (BRI); SFR 143, South Mary LA, Dec 1981, *Hyland 11437* (BRI); SFR 143, Parish of Riflemead, Dec 1984, *Gray 3753* (BRI); Mt Spurgeon, near Schillers Hut, Sep 1972, *Tracey s.n.* (BRI [AQ376171]); Mt Isley, W of Edmonton, Dec 1996, *Jago 4215* (BRI); Davies Creek, in 1962, *Webb & Tracey 6469A* (BRI); SFR 185 Mt Haig, Mar 1968, *Hyland 1398RFK* (BRI).

***Distribution and habitat*:** *Niemeyera discolor* is endemic to Australia from the Wet Tropics bioregion of Queensland where it has been collected from Big Tableland, south of Cooktown to Mt Haig, north-east of Atherton (**Map 4**), and occurs mostly in notophyll vineforest on soils derived from granite and metamorphic rocks from near sea level to 1300 m.

***Phenology*:** Flowers have been recorded from December to January and fruits from September to December.

***Note*:** Placement of this new species in *Niemeyera* is strongly supported by molecular phylogenetic analysis, which places the specimen *Ford 2429* as sister to *N. chartacea* and *N. prunifera* (Swenson *et al.* 2013).

***Etymology*:** The species epithet refers to the difference in colour of the upper and lower lamina surfaces.

4. Niemeyera whitei (Aubrév.) Jessup, *Austrobaileya* 6: 161 (2001); *Amorphospermum whitei* Aubrév., *Adansonia* ser. 2, 5: 23, t.2 (1965). **Type:** New South Wales. Whian Whian State Forest, May 1945, *C.T. White 13043* (holo: BRI; iso: BRI, MEL, NSW).

***Illustration*:** Harden *et al.* (2013).

Shrubs or trees to 20 m high. Twigs felted or tomentose. Leaves with petiole 7–13 mm long; lamina oblanceolate to elliptic, 8–15(–17) cm long, 2.5–6 cm wide, apex acuminate or acute, base acutely or obtusely cuneate, with reddish-brown erect or suberect trichomes below, glabrescent on older leaves; secondary veins 9–15 pairs; tertiary venation horizontal near midvein, oblique in the distal part, prominent below. Flowers in axillary or ramal fascicles of up to 15 flowers; pedicels 0–0.2 mm long, reddish brown tomentose. Calyx ovate, 1.5–2 mm long, acute or obtuse. Corolla lobes 5, 2–2.5 mm long, rounded or obtuse. Stamens 5, 3.5–4 mm long. Ovary ovoid, pilose, style 4–5 mm long. Fruit globose with an indistinct style remnant, 40–60 mm long, 30–60 mm wide, purple-black, glabrous or nearly so. Seed 1, globose, 24–35 mm diameter, shining part of testa elliptic, *c.* 30 mm long and 10 mm wide.

***Additional selected specimens examined*: Queensland.** Moreton District: Cougals Track, Jun 1984, *Jones s.n.* (BRI [AQ440567]); Below northern cliffs of Mt Cougal, Upper Tallebudgera Creek Valley, Nov 1986, *Monteith s.n.* (BRI [AQ440746]); *c.* 50 m from the summit of E peak of Mt Cougal, May 1993, *Thomas RFR29 & Gale* (BRI); Upper Tallebudgera Creek, Dec 1917, *White s.n.* (BRI [AQ34149], NSW); Upper Tallebudgera, on property of L & D Cook, Dec 2003, *Cook s.n. et al.* (BRI [AQ763291]). **New South Wales.** Minyon Falls, Sep 1926, *Cheel s.n.* (NSW41816); Whian Whian SF 173, Jan 1949, *Webb & White 2147* (BRI); Eastern part of Whian Whian SF, Oct 1984, *Hemsley 7058* (MEL, NSW); The Punchbowl, near Copmanhurst, Upper Clarence River, Dec 1969, *O'Grady s.n.* (NSW); 'Araucaria' property at Blackbutt Road, Broken Head, Nov 2008, *Nicholson NJN3025* (BRI); Clarence River, in 1869, *Wilcox s.n.* (MEL 601094); Escarpment below Waihou Trig., 25 km NW of Coffs Harbour, Oct 1978, *Streimann 8131* (BRI, L, NSW); 80 m N of Upper Corindi Road, 250 m E of Hutley's Pass, *c.* 15 km due NW of Woolgoolga, Sep 2001, *Copeland 3146* (BRI); Woolgoolga Creek, Nov 1982, *Williams s.n.* (BRI [AQ338993]); *c.* 6 km W of Woolgoolga, Oct 1984, *Hemsley 7054* (MEL, NSW); Coffs Harbour, Apr 1909, *Lawrence s.n.* (BRI [AQ34148], NSW); Urunga, Sep 1910, *Swain 208* (NSW); Bellinger River, *s.dat.*, *Moore 26* (MEL); *ibid*, *s.dat.*, *Moore s.n.* (NSW17146).

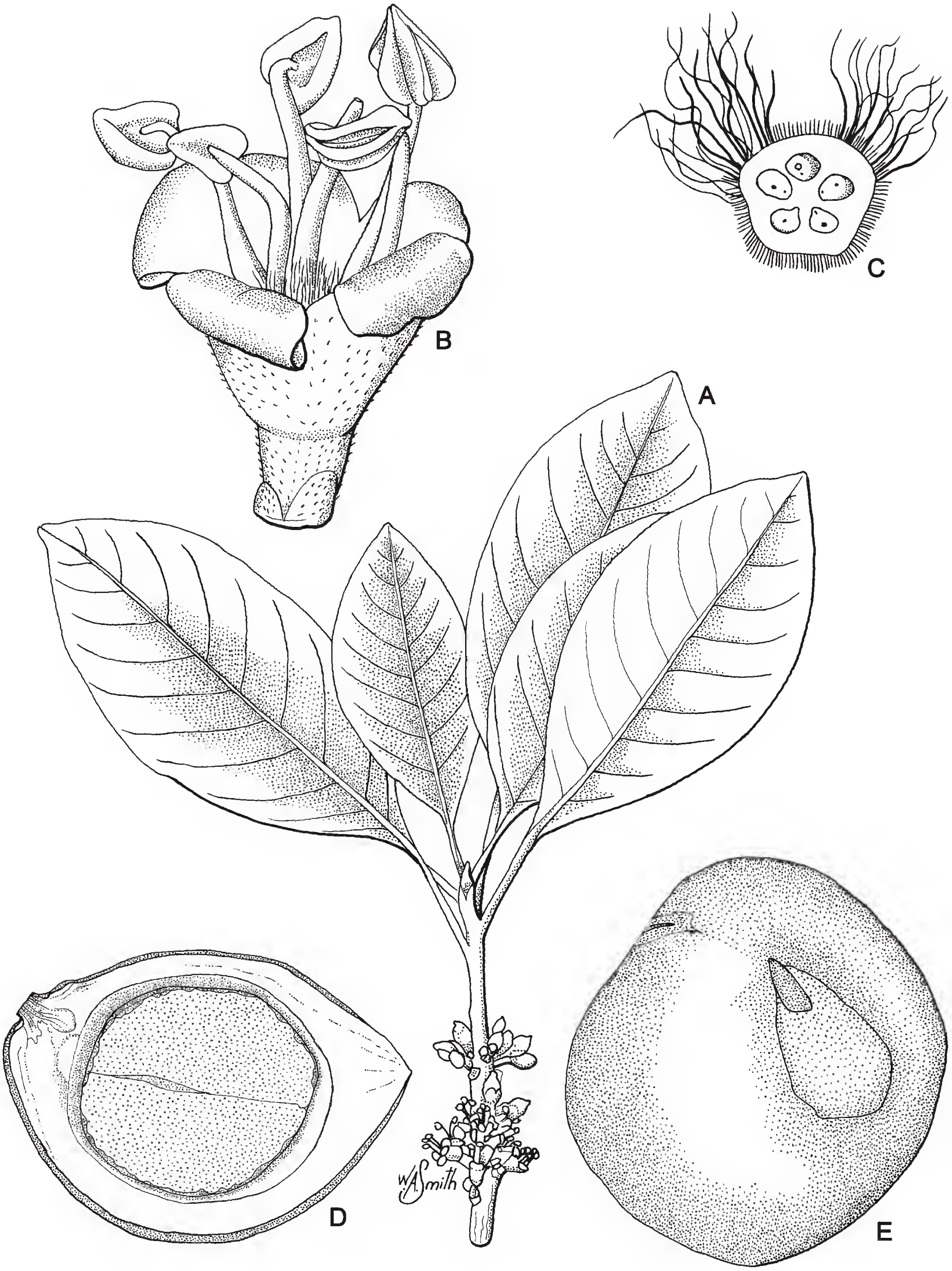

Fig. 3. A–E. ***Niemeyera discolor***. A. habit ×0.8. B. flower ×1. C. cross section of ovary ×16. D. longitudinal section of fruit ×1. E. seed ×2. A–C from *Hyland 13360* (BRI); D–E from *Hyland 8375* (BRI). Del. W. Smith.

***Distribution and habitat*:** *Niemeyera whitei* is endemic to Australia and occurs from Tallebudgera Creek, Queensland to the Bellinger River, New South Wales (**Map 4**), mostly in lowland notophyll vineforest.

***Phenology*:** Flowers have been recorded from September to January; fruit in November and December.

***Conservation status*:** *Niemeyera whitei* is listed as **Vulnerable** under the Queensland *Nature Conservation Act 1992*.

5. AMORPHOSPERMUM

Amorphospermum F.Muell., *Fragm.* 7: 112 (1870). **Type:** *A. antilogum* F.Muell.

Small or medium trees. Stipules absent. Leaves spirally arranged; venation brochidodromous, tertiary venation admedial ramified (descending from the margin and parallel to secondary veins). Inflorescence fasciculate, axillary or ramal, flowers bisexual, mostly isomerous. Calyx a single whorl of 5 or 6 imbricate sepals. Corolla with 5–6(–8) revolute lobes as long as the tube or slightly longer. Stamens inserted opposite each corolla lobe, at the tube orifice, glabrous; filaments well-developed, free, anthers retrorse. Staminodes absent. Disk absent. Ovary 5-locular; placentation axile. Style terete or slightly tapered, longer than ovary. Fruit a 1-seeded berry. Seed globose, not laterally compressed; seed scar adaxial, covering 90% or more of the seed surface, testa slightly woody or bony, 0.5–1 mm thick. Embryo with plano-convex cotyledons; radicle included; endosperm absent.

A monotypic genus from Australia and New Guinea.

Amorphospermum antilogum F.Muell., *Fragm.* 7: 113 (1870); *Lucuma antiloga* (F.Muell.) Benth. & Hook.f. ex F.M.Bailey, *Syn. Queensl. Fl.* 296 (1883); *Sersalisia antiloga* (F.Muell.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Chrysophyllum antilogum* (F.Muell.) Vink, *Blumea* 9: 65 (1958); *Niemeyera antiloga* (F.Muell.) Pennington, *Gen. Sapotac.* 235 (1991). **Type:** Queensland. [PORT CURTIS DISTRICT]: Princhester, 70 miles [112 km] NW of Rockh[ampton], *s.dat.*, [*A.*] *Thozet* [*315*] (lecto: MEL 233068; *fide* Vink 1958: 65).

***Illustrations*:** Francis (1951: 346 & 347); Cooper & Cooper (2004: 506); Hyland *et al.* (2010); Harden *et al.* (2013).

Trees to 18 m high. Twigs densely felted-sericeous. Leaves with petiole 4–18(–20) mm long; lamina elliptic, oblanceolate or obovate, apex acute to rounded, (1.5–)4–12(–16) cm long, (0.8–)1.5–4.5(–6.5) cm wide, underside with straight, appressed, reddish or pale brown trichomes; secondary veins mostly 10–20 pairs; intersecondary and tertiary veins parallel, obscured below by indumentum. Pedicel to 0.5 mm long, reddish brown felted or sericeous. Calyx lobes ovate, 1.8–2.5 mm long. Corolla tube *c.* 1.5 mm long, lobes oblong 2–2.5 mm long, glabrous, apical margin ciliolate. Stamens 5–6(–8), 3–4.5(–5.2) mm long. Ovary conical, pilose; tapering to 3.5–4 mm long style. Fruit globose or subglobose with a shortly attenuate base, 3.5–6 cm long, 3.5–5 cm wide, purple-black to purple-brown, fleshy and 1-seeded, nearly glabrous; style indistinct. Seeds globose, 20–40 mm diameter, testa pale brown, shining part reduced to a narrow ellipse *c.* 12 mm long, 2–3 mm wide. *Brown pearwood.*

***Additional selected specimens examined*:** **Queensland.** COOK DISTRICT: Olive River, Sep 1974, *Hyland 3063RFK* (BRI); Bolt Head, Temple Bay, Jun 1996, *Forster PIF19404* (BRI); Between Massy Creek and Rocky River, Silver Plains Holding, Dec 1979, *Hyland 10148* (BRI); 7 km N of upper crossing of Massey [Massy] Creek, on Silver Plains Station, Nov 1980, *Clarkson 3643* (BRI); 8.5 km SSE of Jeannie River mouth, Starke Pastoral Holding, Oct 1992, *Fell 2650 & Stanton* (BRI); Tributary of Brady Creek, 37 km SSW of Laura in Conglomerate Hills, Jul 2005, *Wannan 4056 & Ray* (BRI). NORTH KENNEDY DISTRICT: Fanning River, Jun 1980, *Godwin C991* (BRI); Cape Cleveland, Bowling Green Bay National Park, S of Townsville, Dec 1992, *Bean 5312* (BRI). SOUTH KENNEDY DISTRICT: S of Collinsville, Nov 2011, *Wiley S52* (BRI); Gorge Creek, Redcliffe Tableland, Jan 1993, *Fensham 510* (BRI); St Pauls Scrub, 13 km SE of St Pauls Homestead, Sep 1991, *Thompson 228 & Dillewaard* (BRI). PORT CURTIS DISTRICT: Marlborough, Oct 1937, *White 12109* (BRI); Marlborough Creek, 10 km from Marlborough township, Aug 1991, *Batianoff MC9108004 & Robins* (BRI); Marlborough Creek, 25 km SW of Marlborough, Nov 1997, *McCabe 28 & Rayner* (BRI); Marlborough area, Gap Creek Road, Spring Creek, Oct 2001, *Batianoff 01103GNB et al.* (BRI); Mt Slopeaway, 7.5 km W of Marlborough, Aug 2000, *Forster PIF25964* (BRI); SFR

28, Upper Stony LA, Oct 1976, *Hyland 4307RFK* (BRI); Byfield, near Keppel Bay, Sep 1931, *White 8034* (BRI); Struck Oil, Mt Morgan, Ironstone Creek, May 2002, *Braddick 2242* (BRI); SF 67 Bulburin, *c.* 3 km S of old Bulburin Forestry Station, Jul 1978, *McDonald 2406 & Stanton* (BRI). Wide Bay District: Mt Bauple, Dec 1922, *Kajewski s.n.* (BRI [AQ34095]); *ibid*, Jan 1928, *Kajewski 76* (BRI). Moreton District: Sapling Pocket, Pine Mt, 12 km NW of Ipswich, Nov 1990, *Bird s.n.* (BRI [AQ501172]). **New South Wales.** Tweed River, in 1871, *Guilfoyle 13* (MEL 2192413A).

***Distribution and habitat*:** *Amorphospermum antilogum* occurs in Australia and New Guinea. In Australia it occurs from the Olive River on eastern Cape York Peninsula, Queensland to the Tweed River, New South Wales (**Map 6**) in notophyll vineforest and vinethicket. At the type locality, it grows in a relatively restricted community of semi-evergreen vinethicket on serpentinite.

***Phenology*:** Flowers have been recorded from June to January; fruit from November to April.

***Typification*:** Wim Vink, a botanist at the Leiden herbarium, was sent a piece of the Thozet material from MEL with a transcribed label, but the number 315 was not included in the transcription, hence his citation of *Thozet s.n.* as the type. He annotated this material and returned it to MEL where it was mounted on (or “returned to”) the sheet MEL 233068. I propose that it is reasonable to regard the entire sheet MEL 233068 as the lectotype. In addition to the omission of the number 315, the transcription includes a misinterpretation of the abbreviation “Rockh” as “Rockingham” rather than “Rockhampton”.

***Notes*:** Some collections of *Amorphospermum* from the vicinity of Julatten, north Queensland have been postulated to represent a distinct taxon (Cooper & Cooper 2004). I have been able to observe only minor differences in the indumentum in flowering material from this area although the habitat is markedly different from that of the type locality. Two specimens in BRI (*Womersley NGF3561* and *Fryar NGF4046*) from Bulolo in Papua New Guinea are currently placed under *A. antilogum* but additional collections, particularly of fruiting material are required to confirm the identification.

6. VAN-ROYENA

Van-royena Aubrév., *Adansonia* ser. 2, 3: 329 (1964) [not 1963]. **Type:** *V. castanosperma* (C.T.White) Aubrév.

Shrubs or trees, hermaphrodite. Leaves spirally arranged, entire or very rarely wavy and somewhat crenate; stipules absent. Venation brochidodromous with long loops, giving an eucamptodromous impression; intersecondary or tertiary veins parallel to secondary veins and becoming reticulate near the margin or completely reticulate between the secondary veins. Inflorescence axillary. Flowers 5-merous, sepals quincuncial, pubescent both sides, persistent in fruit. Corolla tubular, the tube longer than the lobes, lobes cochlear, erect. Stamens inserted above the middle of the corolla tube, glabrous, included; anthers ovate, basifixed. Staminodes inserted in the corolla sinus, oblong, terete at base, flattened and with a few cilia at apex, otherwise glabrous. Ovary 5-locular, ovoid, tapering to a conical style, the apex with round stigmatic areas. Fruit ellipsoid or ovoid; seeds 1 or 2, seed scar elliptical *c.* 90% of seed length; testa brown; cotyledons plano-convex, radicle included, endosperm absent.

A monotypic genus restricted to northeast Queensland.

Van-royena castanosperma (C.T.White) Aubrév., *Adansonia* ser. 2, 3: 329 (1964) [not 1963]; *Chrysophyllum castanospermum* C.T.White, *Bot. Bull. Dept. Agric. Queensland* 21: 12, Plate 5 (1919); *Lucuma castanosperma* (C.T.White) C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 35: 74 (1924); *Pouteria castanosperma* (C.T.White) Baehni, *Candollea* 9: 295 (1942). **Type:** Queensland. Cook District: Malanda “Upper Johnstone River”, January 1918, *C.T. White s.n.* (holo: BRI [AQ22595]).

***Illustrations*:** White (1919: Plate 5); Cooper & Cooper (2004: 509); Hyland *et al.* (2010).

Trees to 15 m high. Twigs glabrous (trichomes on shoots only). Leaf petiole 3–5 mm long; lamina oblanceolate, lanceolate or elliptic, 2.5–12 cm long, 0.8–5 cm wide, apex acuminate, glabrescent; secondary veins

7–13 pairs; tertiary veins descending or laxly reticulate. Pedicels 10–18 mm long, very sparsely hyaline sericeous or glabrous. Calyx lobes ovate or broadly obtuse, 5–5.5 mm long on outside, rounded or obtuse, outside sericeous or glabrous, inside sericeous. Corolla 11–12.5 mm long, tube 7.5–8.5 mm long; lobes 5, depressed ovate or suborbicular, 2–2.5 mm long, obtuse or rounded, margin ciliate. Stamens 5, 1.5–2 mm long, filaments 0.8–1 mm long, anthers 1.4–1.5 mm long. Staminodes subulate, inserted just below the sinus between the corolla lobes. Ovary 4–5 mm long, *c.* 3 mm diameter, sericeous; style 8.8–9.3 mm long, pubescent near base. Fruit ovoid or ellipsoid, 3–6 cm long, 3–4.5 cm wide, often tapering into a persistent style point, eventually deep blackish blue, glabrous or nearly so. Seeds 1 or 2, oblong-ellipsoid when solitary, flattened on one side when a pair, 25–40 mm long, 21–27 mm wide, 27–32 mm thick; testa brown, shining part covering most of seed. *Milky plum.*

***Additional selected specimens examined*: Queensland.** Cook District: Spur SE of Christy's Pocket between Bloomfield & McDowall Range, May 1969, *Smith 14482* (BRI); Lower eastern Thornton Peak, May 1985, *Godwin C2945 & Storch* (BRI); SFR 143, Leichhardt LA, Feb 1982, *Hyland 11683* (BRI, CNS); Portion 49V Parish of Alexandra, Cooper Creek, Dec 1984, *Gray 3815* (BRI); TR 55, Jul 1974, *Hyland 7327* (BRI); Daintree River, Mar 1932, *Brass 2236* (BRI); Forest Creek road just N of Daintree River, May 1992, *Russell 25* (BRI); near Daintree, in 1962, *Webb & Tracey 8157* (BRI); Mossman River mouth, Sep 1948, *Smith & Webb 4014* (BRI, K, L); Rex Range, Mar 1979, *Gray 1345* (BRI); SFR 1073, Parish of Dulanban, Rooty LA, Jan 1988, *Gray 4718* (BRI); Kennedy Highway between Smithfield and Kuranda, Feb 2000, Jago *5566* (BRI); North Bell Peak, lower western slopes, Malbon Thompson Range, Nov 1995, *Forster PIF18005 et al.* (BRI); N of Wonga Beach, Nov 2005, *Wannan 4139 & Gillanders* (BRI); Lake Barrine, Nov 1929, *Kajewski 1350* (BRI, K); Boonjee, near Malanda, Aug 1943, *Blake 15228* (BRI); Malanda, Aug 1943, *Blake 15174* (BRI); Tarzali, Jan 1991, *Sankowsky 1180* (BRI); Palmerston Highway, Dec 1977, *Gray 837* (BRI); 6 km SSW of Millaa Millaa, end of Whiting road, Dec 2000, *Forster PIF26536 et al.* (BRI).

***Distribution and habitat*:** *Van-royena castanosperma* is endemic to the Wet Tropics of northeast Queensland from just north of the McDowall Range to the Cardwell Range south of Millaa Millaa (**Map 7**), in lowland and upland mesophyll and notophyll vineforest, from near sea level up to 1200 m altitude.

***Phenology*:** Flowers have been recorded from January to July; fruits from September to January.

7. PLEIOLUMA

Pleioluma (Baill.) Baehni, *Boissiera* 11: 150 (1965); *Sersalisia* sect. *Pleioluma* Baill., *Hist. Pl.* 11: 280 (1891). **Type:** *P. crebrifolia* (Baill.) Swenson & Munzinger.

Beccariella Pierre, *Not. Bot. Sapot.* 30 (1890), *nom. illeg.*; *non Beccariella* Cesati, *Atti. Reale Accad. Sci. Fis.* 8: 9 (1879). **Type:** *B. sebertii* (Pancher) Pierre.

Shrubs or trees, hermaphrodite or gynodioecious. Leaves spirally arranged, entire; stipules absent. Secondary veins mostly eucamptodromous but brochidodromous with weak loops towards the apex; tertiary veins oblique or horizontal, sometimes obscure and appearing to join areolate quaternary veins. Inflorescence axillary, fasciculate; flowers 5-merous. Sepals free, quincuncial, sericeous or tomentose inside, persistent in fruit. Corolla tubular, glabrous or the lobe margins ciliolate, the tube equal to or slightly longer than the lobes, lobes erect. Stamens attached near the middle of the tube or below, glabrous, included. Staminodes inserted in the corolla sinus, usually oblong and entire, glabrous or sometimes ciliolate at apex. Ovary 5-locular; style exserted prior to anthesis then included, apex with 5 round stigmatic areas. Fruit a berry, seeds 1–5, laterally compressed, testa mostly brown, seed scar narrow covering 80%–100% of seed length; cotyledons thin and foliaceous, radicle exserted below the cotyledon commissure; endosperm copious.

A genus of around 40 species distributed from southeast Asia to New Guinea, Melanesia (especially New Caledonia) and Australia (Swenson *et al.* 2018), with nine species in Australia.

Key to the Australian species of *Pleioluma*

1 Mature lamina on underside glabrescent, soon glabrous or nearly so **2**
1. Mature lamina with a persistent indumentum below, glabrescent with age **6**

2 Fruit 5–6(–8) cm long, 3.5–4.5 cm wide; seeds 30–40 mm long . . . . . **4. P. macrocarpa**
2. Fruit up to 3 cm long, up to 1.5 cm wide; seeds less than 20 mm long. **3**

3 Fruit subglobose or broadly obovoid, pericarp brittle when dry; style remnant *c*. 0.5 mm long, not expanded at the base . . . . **3. P. laurifolia**
3. Fruit ellipsoid or narrowly obovoid, pericarp not brittle when dry; style remnant 2–7 mm long, with an expanded base **4**

4 Pedicel 15–40 mm long . . . . **8. P. singuliflora**
4. Pedicel ≤ 15 mm long **5**

5 Style base and top of ovary marked by a ring of appressed trichomes . . . . **9. P. xerocarpa**
5. Style base and top of ovary glabrous . . . . **7. P. queenslandica**

6 Lamina trichomes on underside closely appressed like a pellicle, more or less covering the epidermis, straight, mostly hyaline, glabrescent; calyx lobes 6–7 mm long . . . . **1. P. brownlessiana**
6. Lamina trichomes tortuous and more or less matted or erect and nearly straight, mostly reddish or dark brown, fading with age; calyx lobes ≤ 5 mm long. **7**

7 Lamina 8–18 cm long; tertiary veins prominent below; pedicels 7–10 mm long; calyx lobes 3–3.5 mm long . . . . **5. P. papyracea**
7. Lamina 2.8–8 cm long; tertiary veins not prominent below; pedicels (12–)16–22 mm long, calyx lobes 3.5–5 mm long **8**

8 Lamina trichomes erect with a short side branch, sometimes two, leaf surface visible between the trichomes; pedicels with reddish-brown tortuous and erect trichomes . . . . **6. P. pilosa**
8. Lamina trichomes appressed and tomentose, obscuring the tertiary veins, leaf surface hidden by the indumentum and visible only with age . . . . **2. P. ferruginea**

1. Pleioluma brownlessiana (F.Muell.) Swenson & Munzinger, *Taxon* 62: 763 (2013); *Achras brownlessiana* F.Muell., *Fragm.* 7: 111 (Dec 1870); *Sideroxylon brownlessianum* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 92 (1883); *Sersalisia brownlessiana* (F.Muell.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Pouteria brownlessiana* (F.Muell.) Baehni, *Candollea* 9: 318 (1942); *Planchonella brownlessiana* (F.Muell.) P.Royen, *Blumea* 8: 343 (1957); *Beccariella brownlessiana* (F.Muell.) Swenson, Bartish & Munzinger, *Cladistics* 23: 221 (2007). **Type:** Queensland. Rockingham Bay, 30 July 1870, *J. Dallachy s.n.* (lecto: MEL 710082 [here selected]; isolecto: MEL 710072, MEL 710081; possible isolecto: MEL 710080, MEL 710083).

Achras ralphiana F.Muell. in Baillon, *Hist. Pl. (Baillon)* 11: 280 (1891), *nom nud.* [see note below]; *Sersalisia ralphiana* (F.Muell.) Baillon, *Hist. Pl. (Baillon)* 11: 280 (1891), *nom. inval.*; *Iteiluma ralphiana* (F.Muell.) Aubrév., *Adansonia* ser. 2, 3: 335 (1964), *nom. inval.*; *Planchonella ralphiana* (F.Muell.) Dubard, *Ann. Mus. Colon. Marseille* ser. 2, 10: 56 (1912), *nom. inval.*

Sersalisia brachyloba Domin, *Biblioth. Bot.* 89: 507 (1928). *Sideroxylon brachylobum* Domin, *Biblioth. Bot.* 89: 507 (1928), *pro.*

syn., *nom. inval.*; *Pouteria brachyloba* (Domin) Baehni, *Candollea* 9: 341 (1942). **Type:** Queensland. Cook District: Lake Eacham, February 1910, *K. Domin s.n.* (holo: PR *n.v.*).

***Illustrations*:** van Royen (1957: 343, fig. 33 [as *Planchonella brownlessiana*]); Hyland *et al.* (2010).

Trees to 25 m high. Twigs greyish-brown with short appressed trichomes. Leaves with petiole 7–20 mm long, channelled above; lamina oblanceolate or obovate, 4–12(–15) cm long, 1.5–5.5 cm wide, apex acuminate to rounded, soon becoming glabrous above, with hyaline closely appressed trichomes below appearing pellicle-like, glabrescent with age; margins flat; secondary veins 5–10 pairs; tertiary veins horizontal, mostly obscure. Flowers solitary or 2 or 3 together; pedicels terete, 10–35 mm long, hyaline sericeous. Calyx lobes broadly elliptic or ovate, 6–7 mm long, sericeous on both sides. Corolla tube 5–5.5 mm long, lobes 5, quadrangular, 2–3 mm long, distal margin ciliolate. Stamens 5, 2.5–3 mm long; filaments 1.4–1.7 mm long, attached at or just below the middle of the tube; anthers 1.5–1.7 mm long. Staminodes oblong or slightly broader at the base, 2–2.4 mm long. Disk small, 5-lobed, white or hyaline hirsute. Ovary ovoid, 5-lobed, *c.* 2 mm long, glabrous at base, sericeous above, tapering to the conical style; style *c.* 7.5 mm long, sericeous then distally glabrous for *c.* 4 mm to the stigmas. Fruit ellipsoid, 2.5–3 cm long, 1–1.3 cm wide, often oblique at apex, dark purple, glabrous except for remnants of disk and style base; style persistent, 7–9 mm long, appressed pubescent around the thickened base, distally glabrous. Seeds 1(–2), ellipsoid-ovoid, flattened on one side, 15–19 mm long, 8–9 mm wide, 6–7 mm thick; testa dark brown; seed scar up to 14 mm long and 1.5 mm wide.

***Additional selected specimens examined*:** **Queensland.** Cook District: Upper Parrot Creek, Annan River, Sep 1948, *Brass 20247* (BRI); Mossman River Gorge, Feb 1932, *Brass 2142* (BRI); Little Mossman LA, Aug 1973, *Risley 103* (BRI); SFR 143, Little Mossman LA, Nov 1978, *Gray 1139* (BRI); Davies Creek, Jan 1962, *Hyland 2279* (BRI, L); Bridle Creek, W of Kuranda, Nov 2004, *Bartish & Ford 17* (BRI); SFR 675, Parish of Cairns, Shoteel LA, Oct 1983, *Gray 3275* (BRI); SFR 185, Robson LA, Apr 1972, *Sanderson 71* (BRI); SFR 194, Parish of Herberton, Hugh Nelson Range, Mar 1981, *Gray 1929* (BRI); SFR 652 Mt Fisher, May 1975, *Hyland 3177RFK* (BRI, CANB, L); SFR 185, Robson LA, Apr 1972, *Sanderson 71* (BRI, L); Reserve 310, Gadgarra, Mar 1954, *White s.n.* (BRI [AQ68233], L); Topaz Road, E of Malanda, Nov 2004, *Bartish & Ford 28* (BRI); Westcott Road, Topaz, Oct 2004, *Cooper WWC1898 et al.* (BRI). North Kennedy District: Arthur Bailey road, S of Ravenshoe, Jun 1995, *Forster PIF16743* (BRI); Koolmoon Creek, *c.* 11 miles [17.6 km] due SSE of Ravenshoe, Sep 1950, *Smith 3735* [distributed as *4635*] (BRI); Kirrama Range, Bryce Henry LA, SF 344, *c.* 38 km NW of Kennedy, Nov 1989, *Fell DF2037* (BRI).

***Distribution and habitat*:** *Pleioluma brownlessiana* is endemic to the Wet Tropics bioregion of north-east Queensland from the Annan River south of Cooktown to near Cardwell (**Map 8**). It occurs in several types of rainforest up to 1200 m altitude.

***Phenology*:** Flowers have been recorded from March to November and fruits from August to January.

***Note*:** *Achras ralphiana* is a *nomen nudum* because it was simply referred to under the description of a new section *Pierella* of the genus *Sersalisia* by Baillon. The reason why Mueller chose to name this tree for Brownless rather than Ralph, as was written on the labels but never corrected, remains obscure. However, there is sufficient similarity between the draft handwritten description mounted on the sheet MEL 710082 and the published description as well as the handwritten labels all bearing the name *Achras ralphiana* in Mueller's hand to indicate they refer to the same collection.

2. Pleioluma ferruginea Jessup **sp. nov.** differing from *P. papyracea* in the tertiary veins being not prominent below and from *P. brownlessiana* and *P. pilosa* in the lamina indumentum being mostly tortuous and more or less matted and from all the other Australian species by the persistent indumentum on the underside of the lamina. **Typus:** Queensland. Cook District: State Forest Reserve 143, Parish of Riflemead, North Mary Logging Area, 14 July 1988, *B. Gray 4887* (holo: BRI; iso: CNS).

Planchonella sp. (Mt Lewis B.P. Hyland 579); Jessup (1994).

Pouteria sp. (Mt Lewis B.P.Hyland 579); Jessup (1997; 2002, 2007).

Planchonella sp. (Mt Lewis B.Hyland 14048); Jessup (2010).

Pleioluma sp. (Mt Lewis B.P.Hyland 14048; Jessup (2015).

***Illustrations*:** Hyland (1971), as *Planchonella singuliflora RFK579*; Hyland *et al.* (2010).

Shrubs or trees to 5 m high (or more). Twigs with appressed, dark reddish brown straight and shortly tortuous trichomes, glabrescent. Leaves with petiole 6–25 mm long, channelled above; lamina obovate, oblanceolate or elliptic, 2.8–8 cm long, 1–4 cm wide, apex acute or obtuse or rounded, base shortly attenuate, appressed tomentose, glabrescent above, persistent below; secondary veins 6–9 pairs; tertiary veins obscured by indumentum below. Flowers 1–3 in leaf axils; pedicels (12–)16–22 mm long, with reddish brown appressed trichomes. Calyx lobes broadly ovate, 3.5–5 mm long, acute, reddish brown appressed pubescent on outside and inside. Corolla 8–9 mm long, lobes oblong-obovate to suborbicular, 2–2.5 mm long, ciliate on distal margin and sometimes with a few short trichomes on inner surface. Stamens 2.5–3 mm long, filaments 1.5–1.8 mm long, attached near the middle of the tube, anthers 2 mm long. Disk a ring of sericeous trichomes at the base of the ovary. Ovary ovoid-conical, *c.* 1.5 mm long, tapering to the conical style; style 5–6 mm long, appressed pubescent on lower half. Fruit ellipsoid, up to 2 cm long, 0.7–0.8 cm wide, fleshy, purple; style persistent, 6–7 mm long with an expanded and appressed pubescent base. Seed 1, ellipsoid, *c.* 17.5 mm by 6 mm by 4.5 mm (one specimen). **Fig. 4A–F.**

***Additional selected specimens examined*: Queensland.** Cook District: Summit of Mt Spurgeon, W of Mossman, Aug 1971, *van Balgooy 1611* (K, L); Summit of Mt Spurgeon, Aug 1971, *Stocker 774* (BRI, K, L); TR 140, Cow LA, Sep 1973, *Hyland 2874RFK* (BRI); North Mary LA, SF 143, Jul 1994, *Forster PIF15633 et al.* (BRI); *ibid*, Sep 2001, *Ford AF2452 & Holmes* (BRI); SFR 143 Riflemead, North Mary LA, Mar 1988, *Hyland 25406RFK* (CNS image!); SFR 143, Parish of Riflemead, Jun 1988, *Gray 4858 & 4859* (BRI); *ibid*, Sep 2003, *Gray 8749 & Jones* (BRI); *ibid*, Jul 1990, *Hyland 14048* (BRI, CNS); TR 130, Mt Lewis, *c.* 45 miles [72 km] NW of Cairns, Dec 1964, *Hyland 3444* (BRI, K, L); Mt Lewis Road, Jan 2009, *Gray 9279* (BRI).

***Distribution and habitat*:** *Pleioluma ferruginea* is endemic to the Wet Tropics bioregion of north-east Queensland, from Mt Spurgeon to Mt Lewis (**Map 11**), in simple evergreen notophyll and microphyll vineforest and vinethicket at altitudes of 1000 to 1300 m.

***Phenology*:** Flowers have been recorded from June to September and January; fruit in July.

***Etymology*:** The species epithet refers to the rusty brown colour of the indumentum on the newly expanded foliage and flower buds of this species.

3. Pleioluma laurifolia (A.Rich.) Swenson, *Taxon* 62: 764 (2013); *Sersalisia laurifolia* A.Rich. in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 84 (1834); *Achras laurifolia* (A.Rich.) F.Muell. ex Benth., *Fl. Austral.* 4: 282 (1868); *Sideroxylon richardii* F.Muell., *Syst. Census Austral. Pl.* 92 (1883); *Sideroxylon laurifolium* (A.Rich.) Engl. in Engler & Prantl, *Nat. Pflanzenfam. [Engler & Prantl]* 4(1): 144 (1890), *Bot. Jahrb. Syst.* 12: 517 (1890), *nom illegit. non* Lam. (1783); *Planchonella laurifolia* (A.Rich.) Pierre, *Not. Bot. Sapot.* 36 (1890); *Sideroxylon laurifolium* (A.Rich.) F.M.Bailey, *Queensland Fl.* 3: 957 (1900), *nom. illeg. non* Lam. (1783); *Pouteria richardii* (F.Muell.) Baehni, *Candollea* 9: 287 (1942); *Beccariella laurifolia* (A.Rich.) Aubrév., *Adansonia* ser. 2, 2: 193 (1962). **Type:** [Northern Territory] Baie Morton, NH [Melville Island] Voyage l'Astrolabe 6 [*s.dat.*, *C. Fraser s.n.*] (holo: P; iso: E, G, K).

[*Planchonella xerocarpa*, *auct. non* (F.Muell. ex Benth.) H.J.Lam; Dunlop (1987)].

***Illustration*:** Dumont d'Urville (1833: 84) [as *Sersalisia laurifolia*].

Trees to 20 m high. Twigs with appressed or felted trichomes. Leaves with petiole 12–30 mm long; lamina oblanceolate, oblong or narrowly obovate, (4–)8–15 cm long, 2.2–5 cm wide, apex acuminate, acute or obtuse, glabrescent; margins flat; secondary veins mostly 8–15 pairs; tertiary veins oblique or

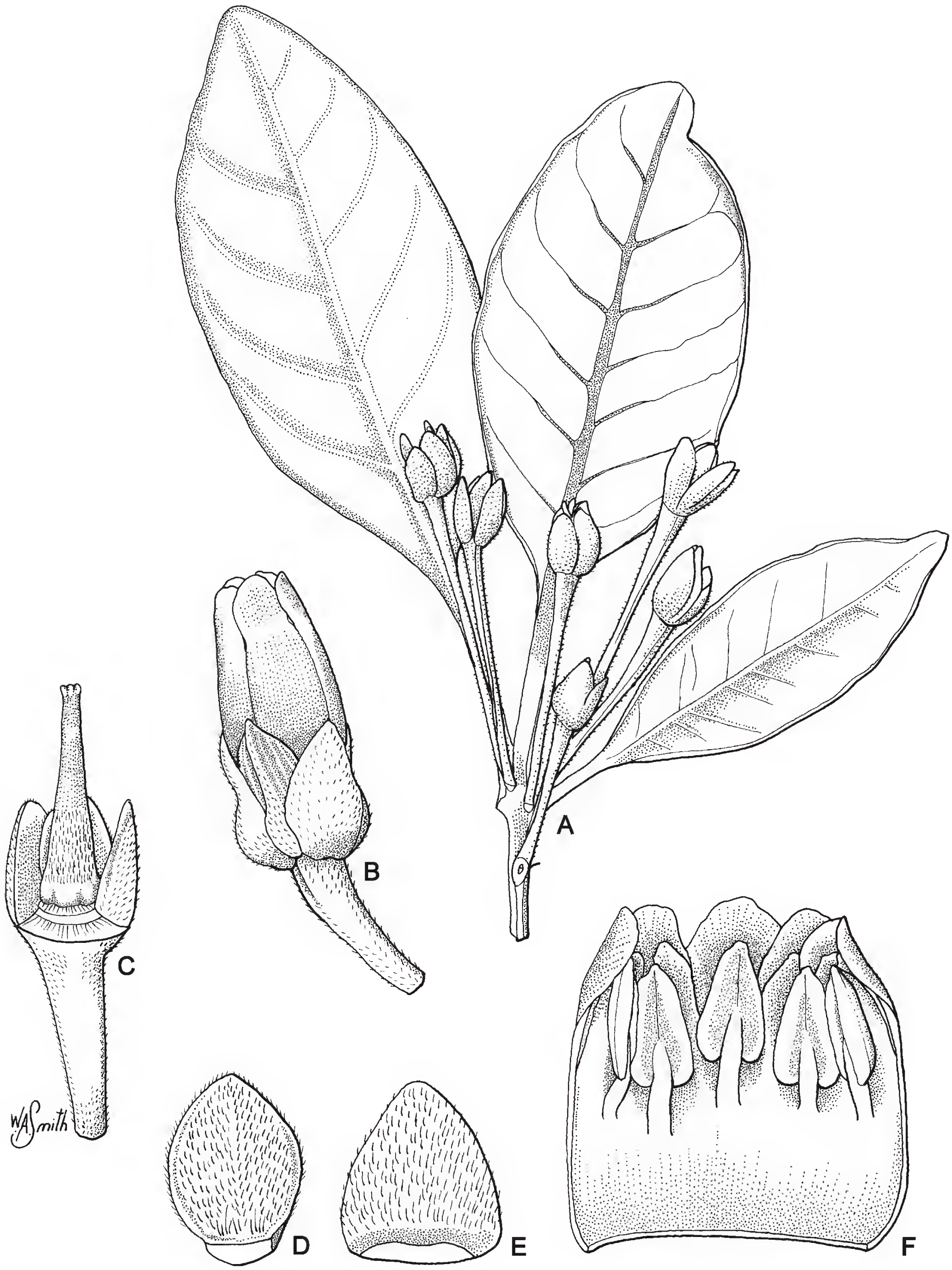

Fig. 4. A–F. ***Pleioluma ferruginea***. A. habit ×2. B. flower ×4. C. dissected flower with corolla and two sepals removed ×4. D. inner sepal ×6. E. outer sepal ×6. F. dissected corolla ×8. A from *Gray 4887* (BRI); B from *Hyland 14048* (BRI); C–F from *Gray 4858* (BRI). Del. W. Smith.

horizontal, not prominent. Flowers several in axillary clusters; pedicels 6–15 mm long, with appressed trichomes. Calyx lobes broadly ovate to depressed ovate, 2–2.5 mm long; on outside appressed pubescent or felted, on inside sericeous. Corolla 2.8–3.5 mm long, tube 1.4–1.6 mm long, lobes oblong-linguiform, truncate, 1.4–1.6 mm long, margin mostly entire. Stamens 2–2.2 mm long, filaments 1.7–1.8 mm long, attached just above the base of the tube, anthers *c.* 0.8 mm long. Disk indistinct from base of ovary, pilose; ovary ovoid, *c.* 1 mm long, tapering to the style, mostly glabrous above the base; style 2–3 mm long, narrowly conical, glabrous. Fruit subglobose or broadly obovoid, 1.4–2 cm long, 1–1.2 cm wide, black, glabrous except for a few trichomes near the base, pericarp brittle when dry, style remnant *c.* 0.5 mm long, not expanded at the base. Seeds up to 4, ovoid or ellipsoid, often flattened on one surface, 11–13 mm long; 5–5.5 mm wide and 4.3–6.2 mm thick; seed scar *c.* 0.5 mm wide, less than half the length of the seed.

***Additional selected specimens examined*:** **Northern Territory.** Taracumbie Creek, Melville Island, May 1978, *Webb & Tracey 12378* (BRI); Moyle River Catchment Area, Kurrowa Creek, May 1983, *Dunlop 6489 & Wightman* (BRI); Muldiva Creek, Feb 1989, *Dunlop 7978 & Leach* (BRI); *ibid*, May 1983, *Dunlop 6489 & Wightman* (BRI); Kakadu NP, bottom of Mangela Creek Falls, Mar 2002, *Dixon & Leach 1032* (BRI); Kakadu NP, 15 km SE of Jim Jim Falls, Jun 1988, *Russell-Smith 5698 & Lucas* (BRI); Sandy Creek Falls, Litchfield NP, Jul 1990, *Russell-Smith 8321 & Lucas* (BRI); 10 km SE of Jabiru, Mar 1981, *Craven & Whitbread 7850* (BRI); Tolmer Falls, Litchfield Park, Sep 1990, *Brock 734* (BRI); *ibid*, Jun 1991, *Brock 791* (BRI); 10 miles [16 km] NE Moline, Mar 1971, *Dunlop & Byrnes 2101* (BRI); Radon Creek, Mt Brockman, West Arnhem Land Escarpment, May 1978, *Webb & Tracey 12379* (BRI); *ibid,* May 1978, *Webb & Tracey 12763* (BRI); McCallums Creek, Woolaning Station, NW of Mt Tolmer, May 1978, *Webb & Tracey 12380 & 12761* (BRI); Few km N of Woolaning on Bamboo Creek road, May 1978, *Webb & Tracey 12584* (BRI); Twin Falls Gorge, Jim Jim Creek, West Arnhem Land Escarpment, May 1978, *Webb & Tracey 12764* (BRI); NE of Blyth Homestead, western bottom slopes of Mt Tolmer, May 1978, *Webb & Tracey 12762* (BRI); 13° 20’ S 131° 05’ E, Jan 1972, *Byrnes 2478* (BRI).

***Distribution and habitat*:** In Australia *Pleioluma laurifolia* occurs in the Northern Territory in scattered localities from Melville Island to the Moyle River and Kakadu National Park (**Map 9**), predominantly in evergreen notophyll vineforest. It also occurs in Malesia, including New Guinea.

***Phenology*:** Flowers mostly March to July. Fruit mostly July to February.

***Typification*:** Only two of many specimens cited by van Royen (1957) belong to *Pleioluma laurifolia*, *viz.* Melville Island, *Fraser 226* (K) and Moreton Bay: Voyage de l’Astrolabe 6 (P). Both are almost certain to be replicates of the same gathering, the Paris specimen being part of a gift of specimens to the French visitors to Sydney on the second voyage of the Astrolabe (1826–1829) by Charles Fraser along with some of his Moreton Bay collections. This appears to be the reason why the Paris specimen is labelled “Baie Morton, N.H.”. See note under *Pouteria queenslandica* in Jessup (2001).The remaining specimens cited by van Royen (1957) as well as his Fig. 31 under *Planchonella laurifolia* are referable to *Pleioluma queenslandica*.

4. Pleioluma macrocarpa (P.Royen) Swenson, *Taxon* 62: 764 (2013); *Planchonella macrocarpa* P.Royen, *Blumea* 8: 320, 429, fig. 27 (1957); *Pouteria pearsoniorum* Jessup, *Austrobaileya* 6: 163 (2001), *non Pouteria macrocarpa* (Martius) D.Dietrich, *Syn. Pl. [D. Dietrich]* 1: 431 (1839) *et non Pouteria macrocarpa* (Huber) A.Ducke, *Bol. Técn. Inst. Agron. N.* No.8. 11 (1946); *Beccariella macrocarpa* (P.Royen) Swenson, Bartish & Munzinger, *Cladistics* 23: 221 (2007). **Type:** Queensland. Cook District: Kaban, *s.dat.*, *Pearson brothers s.n.* (holo: BRI [AQ22578]; iso: BRI, L).

***Illustrations*:** van Royen (1957: 321, fig. 27 [as *Planchonella macrocarpa*]); Cooper & Cooper (2004: 511); Hyland *et al.* (2010) [latter two as *Pouteria pearsoniorum*].

Trees to 25 m high. Twigs with persistent reddish-brown appressed trichomes. Leaves with petiole channelled above, (25–)40–85 mm long, covered in short reddish-brown appressed trichomes, glabrescent; lamina narrowly obovate or elliptic, (6–)10–26 cm long, (2.5–)5–7 cm wide, apex obtuse or rounded or acute or bluntly acuminate, glabrescent, soon glabrous; margins flat or recurved; secondary veins 6–12 pairs; tertiary veins indistinct, slightly raised below, oblique to nearly horizontal near lamina apex. Flowers axillary (solitary or few?); pedicels 6–10 mm long, pale to reddish brown sericeous or felted. Calyx lobes broadly ovate to lanceolate, 4.5–6 mm long, sericeous both sides. Corolla tube 4–4.5 mm long, lobes obovate, 2.5–3 mm long, margin mostly entire. Stamens 5, 3–3.5 mm long, attached near the middle of the corolla tube, filaments 2.5–2.7 mm long, anthers *c.* 1.2 mm long. Staminodes linear, *c.* 1.5 mm long. Disk pulvinate, 5-lobed, hirsute. Ovary ovoid, *c.* 2 mm long, glabrous, tapering to the conical style *c.* 5.5 mm long, glabrous. Fruit ellipsoid, 5–6(–8) cm long, 3.5–4.5 cm wide, dark purple, glabrous. Seeds 1–3, obovoid, laterally flattened, 30–40 mm long, 10–13 mm wide, 16–19 mm thick; testa light brown; scar slightly shorter than the seed and *c.* 3 mm wide.

***Additional selected specimens examined*: Queensland.** Cook District: Daintree NP, NW of Black Mountain, May 1998, *Forster PIF22889 et al.* (BRI); TR 143 Zarda LA, near Zarda Clearing, Sep 1973, *Hyland 2903RFK* (BRI, CANB, L); Mt Spurgeon near Schillers Hut, Sep 1972, *Webb & Tracey 11786* (BRI); Mt Lewis, Oct 1971, *Webb & Tracey 10505* (BRI); SFR 143, North Mary LA, Dec 1977, *Gray 825* (BRI); *ibid*, Dec 1982, *Gray 2900* (BRI); SFR 263, Apr 1971, *Stocker 661* (BRI, L); SFR 194, Herberton Range, Plath Road, Nov 1980, *Gray 1838* (BRI); Longlands Gap, Feb 1980, *Winter L71* (CNS); SFR 194, Parish of Barron, Longlands Gap, Sep 1987, *Gray 4603* (BRI).

***Distribution and habitat*:** *Pleioluma macrocarpa* is endemic to the Wet Tropics bioregion of north-east Queensland and occurs from Black Mountain in the Daintree NP to Mt Lewis and also in the Herberton Range SF between Herberton and Ravenshoe (**Map 10**).

***Phenology*:** Flowers have been recorded in February; fruits in September and November to January.

5. Pleioluma papyracea (P.Royen) Swenson, *Taxon* 62: 765 (2013); *Planchonella papyracea* P.Royen, *Blumea* 8: 347, 431 fig. 35 (1957); *Beccariella papyracea* (P.Royen) Aubrév., *Adansonia* ser. 2, 3: 335 (1964); *Pouteria papyracea* (P.Royen) Baehni, *Boissiera* 11: 59 (1965). **Type:** Queensland. Cook District: 20 miles [32.2 km] NE of Atherton, 11 November 1949, *N.L. Krauss 102* (holo: BRI; iso: L).

***Illustrations*:** van Royen (1957: 348, fig. 35 [as *Planchonella papyracea*]); Cooper & Cooper (2004: 511); Hyland *et al.* (2010) [latter two as *Pouteria papyracea*].

Trees to 35 m high. Twigs with reddish brown appressed and matted trichomes. Leaves with petiole flattened above, (14–)20–30 mm long, puberulous; lamina obovate, 4–15 cm long, 3–7.5 cm wide, apex obtuse, base broadly acute, with appressed trichomes above and below, glabrescent; margins recurved or revolute; secondary veins 8–17 pairs, prominently raised below; tertiary veins oblique, prominently raised below. Flowers several in each axil; pedicels 7–10 mm long, reddish brown felted. Calyx lobes ovate, 3–3.5 mm long; reddish brown felted outside, sericeous on inside. Corolla tube 2–2.5 mm long, lobes suborbicular or quadrangular, 2–2.2 mm long, distal margin sparsely ciliolate. Stamens 5, 2.5–3 mm long, attached between base and middle of tube, filaments 1.8–2 mm long, anthers 1.1–1.2 mm long. Staminodes oblong, truncate, 1.5–2 mm long. Disk reddish brown hispid. Ovary ovoid, *c.* 1.5 mm long, reddish brown hispid, tapering to the style; style narrowly conical, 3–4 mm long, glabrous. Fruit obovoid to narrowly obovoid, 2–3 cm long, 1.5–2.5 cm wide, dark purple to black, glabrescent or glabrous, rounded with a depression at the apex containing the persistent style *c.* 1.5 mm long; the depression bearing persistent appressed trichomes. Seeds 1 or 2, obovoid, flattened on one side, 15–19 mm long, 9–11 mm wide, 8–9 mm thick; scar 12–15 mm long and up to 2 mm wide.

***Additional selected specimens examined*: Queensland.** Cook District: SFR 144 Windsor Tableland, Nov 1977, *Stocker 1621* (BRI); SFR 144, Aug 1977, *Gray 633* (BRI); SFR 143, Windmill LA, Mar 1979, *Gray 1297* (BRI, CNS, MEL); SFR 607 Emerald LA, Aug 1980, *Gray 1777* (BRI); SFR 185, Emerald Creek LA, May 1971, *Dockrill 84* (BRI); SFR 607, Davies LA, Jan 1982, *Gray 2342* (BRI); SFR 194, Parish of Barron, Scrubby LA, Mar 1987, *Gray 4434* (BRI); SFR 185, Noel LA, Feb 1978, *Risley 479* (BRI); Tinaroo Range, near Danbulla, Jan 1947, *Byrne s.n.* (BRI [AQ34535]); SFR 194, Hugh Nelson Range, Sep 1980, *Gray 1787* (BRI, CNS); *ibid*, Oct 1975, *Irvine 1637* (BRI); On the range between

Atherton and Herberton, SFR 99, Dec 1952, *White 53/266 (426)* (BRI); Reserve 99, Western, Mar 1954, *White 710* (BRI). North Kennedy District: Herberton Range, in 1962, *Webb & Tracey 7943* (BRI); Girrungun NP, off walking track, *c.* 1.3 km from Burgoo Creek, CSIRO EP 19, W of Ingham, Nov 2005, *Ford 4762 & Bradford* (BRI); Mt Fox, Dec 1954, *Volk 942* (BRI); Mt Spec, *c.* 32 km S of Ingham, Sep 1954, *Smith 5358* (BRI). South Kennedy District: Eungella Ra[nge], *s.dat.*, *Crain s.n.* (BRI [AQ34542]).

***Distribution and habitat*:** *Pleioluma papyracea* is endemic to north-east Queensland from Mt Windsor Tableland to Eungella Range (**Map 10**) and occurs mostly in notophyll vineforest on soils derived from granite or rhyolite.

***Phenology*:** Flowers have been recorded from January to March and fruit from August to February.

6. Pleioluma pilosa Jessup **sp. nov.** differing from *P. papyracea* in the tertiary veins being not prominent below and from *P. brownlessiana* and *P. ferruginea* in the lamina indumentum being mostly erect and not appressed to the leaf lamina and all the other Australian congeners by the persistent indumentum on the underside of the lamina. **Typus:** Queensland. Cook District: Wooroonooran National Park, along track to Towalla Mine, 17 January 2014, *A. Ford AF6291 & W. Cooper* (holo: BRI).

Trees to 18 m high. Twigs tomentose with mostly erect, tortuous or curved reddish brown 2-branched trichomes, glabrescent. Leaves with petiole channelled above, (6–)8–12(–17) mm long; lamina obovate or broadly elliptic to almost orbicular, 2–7(–12) cm long, 1.5–4(–6) cm wide, adult foliage with apex obtuse or rounded, base obtuse and recurved margins, juvenile foliage with apex oblanceolate and acuminate, base acute or attenuate and flat margins, at first densely tomentose with tortuous and erect reddish brown trichomes, the upper surface nearly glabrous at full expansion, the lower surface with mostly erect 2 or rarely 3-branched trichomes, glabrescent and nearly glabrous when older; secondary veins (4–)6–9 pairs, impressed above, conspicuous below; tertiary veins oblique, obscure above and slightly less so below. Flowers 1–3 in leaf axils; pedicels (12–)15–18 mm long, with reddish brown tortuous and erect trichomes. Calyx lobes narrowly ovate, 4–5 mm long, acute, reddish brown tomentose on outside, sericeous on inside. Corolla 8.8–9.2 mm long, lobes suborbicular, 2.5–3 mm long, ciliate on distal margin, the corolla is elsewhere glabrous. Stamens 2.5–3 mm long, filaments 1.6–1.8 mm long, attached near the middle of the corolla tube, anthers *c.* 1.6 mm long. Disk indistinct, sericeous. Ovary ovoid-conical, *c.* 2.5 mm long, appressed pubescent and tapering to the conical style; style *c.* 7.5 mm long, appressed pubescent on lower half. Fruit not seen. **Figs. 5A–E, 6, 7.**

***Additional specimens examined*:** **Queensland.** Cook District: Gadgarra SF, SW of extension of Gadaloff Road, Apr 1995, *Horton SH1257* (BRI); Ridgeline between Butcher Creek and Caribou Creek, near spot height 652, Gadgarra SF, Jun 1995, *Hunter JH3993* (BRI); Narrow ridgetop on E fall of Bellenden Ker, Jan 1995, *Hunter JH945A* (BRI); Narrow ridgetop on Bartle Frere Track, Jan 1995, *Hunter JH446* (BRI); NPR 904, Wooroonooran, along Donkey Track off Russell River Track, site 29, above Chuck Lunga Creek, Oct 2001, *Ford AF2958 et al.* (BRI); Topaz, Dec 1983, *Tucker 38* (BRI); Towalla, W end of Francis Range, Aug 1995, *Hunter JH5279* (BRI).

***Distribution and habitat*:** *Pleioluma pilosa* is endemic to the Wet Tropics of north-east Queensland and is distributed along the eastern edge of the Atherton Tableland in Gadgarra SF and Wooroonooran NP to the western end of the Francis Range (**Map 11**). It occurs in simple notophyll vineforest on soils derived from granitic or metamorphic rocks.

***Phenology*:** Flowers have been recorded in January.

***Etymology*:** The species epithet refers to the long ascending trichomes particularly on the lamina undersurface of this species.

7. Pleioluma queenslandica (P.Royen) Swenson, *Taxon* 62: 765 (2013); *Planchonella queenslandica* P.Royen, *Blumea* 8: 341, 430 (1957); *Beccariella queenslandica* (P.Royen) Aubrév., *Adansonia* ser. 2, 3: 335 (1964); *Pouteria queenslandica* (P.Royen) Jessup, *Austrobaileya* 6: 161 (2001). **Type:** Queensland. South Kennedy District: Eungella Mts, 31 March 1937, *H.H. Haines 136Q* (holo: K).

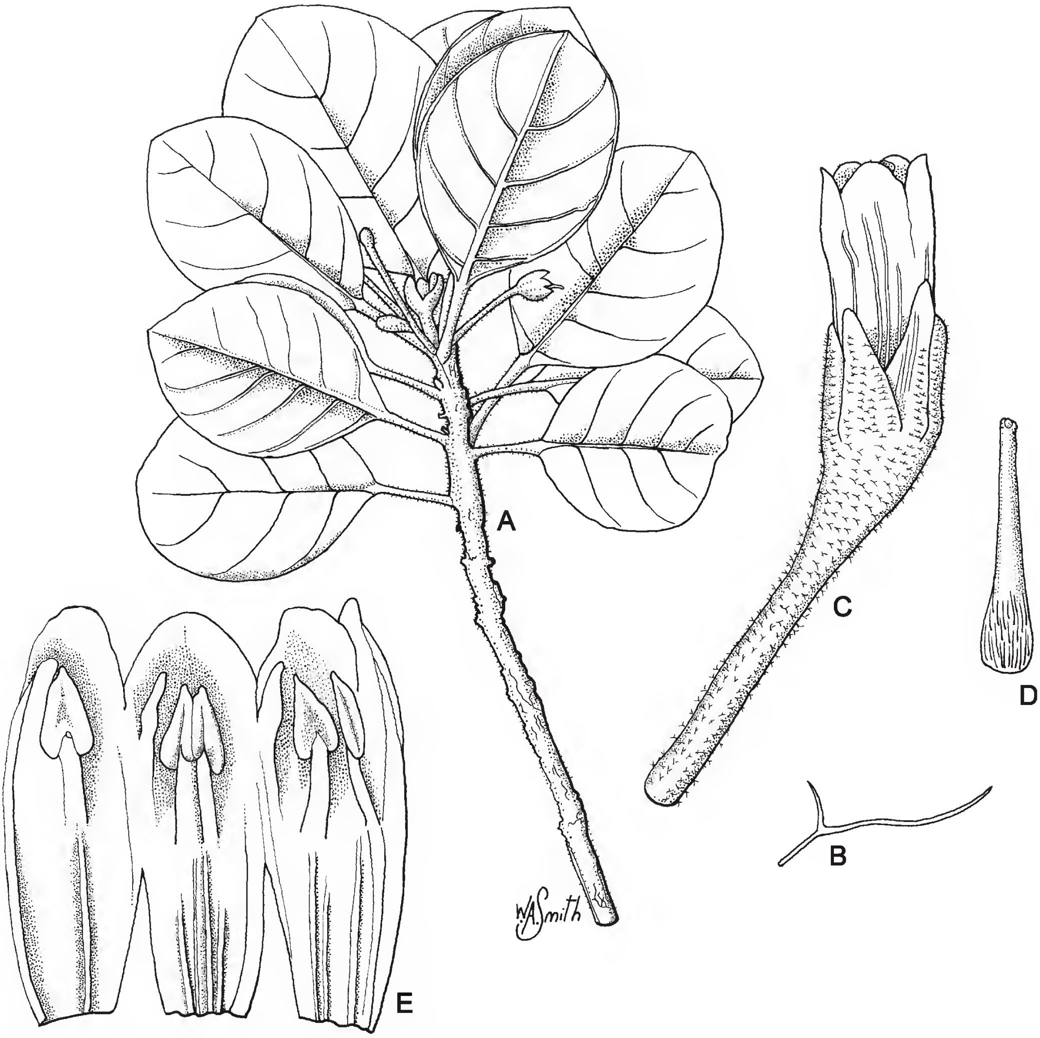

Fig. 5. A–E. *Pleioluma pilosa*. A. habit ×1. B. trichome from underside of lamina ×48. C. flower ×4. D. ovary ×4. E. dissected corolla ×6. All from *Ford AF6291 & Cooper* (BRI). Del. W. Smith.

Sideroxylon laurifolium (A.Rich.) F.M.Bailey, *Queensland Fl.* 3: 957 (1900) *pro parte*, excluding Fraser specimen.

[*Planchonella laurifolia auct. non* (A.Rich.) Pierre; Francis (1951: 352–353); van Royen (1957: 339–341, excluding type and Northern Territory specimens)].

***Illustrations*:** Francis (1951: 350 & 351 [as *Planchonella laurifolia*]; van Royen (1957: 340, fig. 31 [as *Planchonella laurifolia*], 342, fig. 32 [as *Planchonella queenslandica*]); Hyland *et al.* (2010); Harden *et al.* (2013) [as *Pouteria queenslandica*].

Trees to 30 m high, sometimes gynomonoecious. Twigs with few appressed trichomes, glabrescent. Leaves with petiole channelled above, 10–25 mm long, sericeous but soon glabrous; lamina elliptic or oblong or obovate, 5–14 cm long, 1.5–5.5 cm wide, apex obtuse or emarginate, base acute or shortly attenuate, glabrous above, with very sparse appressed trichomes and glabrescent below;

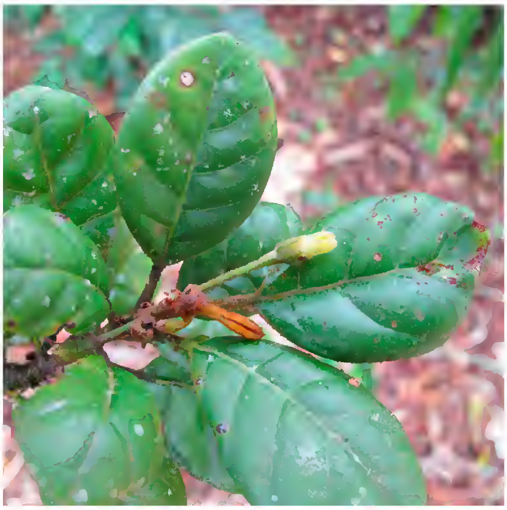

Fig. 6. ***Pleioluma pilosa*** (*Ford AF6291 & Cooper*, BRI). Photo: A. Ford.

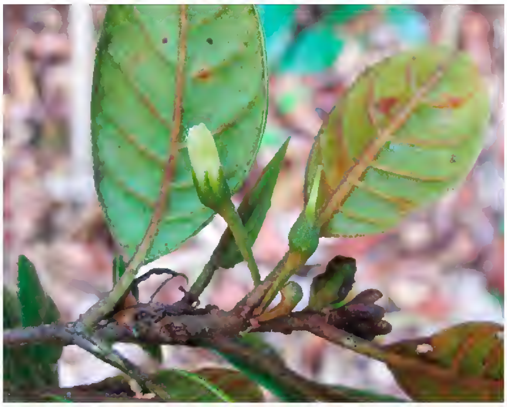

Fig. 7. ***Pleioluma pilosa*** (*Ford AF6291 & Cooper*, BRI). Photo: A. Ford.

margins mostly flat; secondary veins 6–10 pairs, not prominent; tertiary veins weakly oblique, often indistinct. Flowers 1–4, axillary; pedicels slender, angular, 5–12 mm long, with white appressed trichomes, glabrescent. Calyx lobes broadly ovate or depressed ovate, 2.2–2.8 mm long; on outside appressed pubescent or sericeous, glabrescent, on inside sericeous. Corolla tube 2.7–3 mm long, lobes suborbicular, 2–2.5 mm long, margin usually sparsely ciliolate. Stamens 5(–6), 2.5–2.7 mm long; filaments 1.5–2 mm long, attached near the middle of the tube; anthers 1.5 mm long. Staminodes oblong 1–1.5 mm long. Disk inconspicuous, hirsute. Ovary ovoid, *c.* 1.2 mm long, glabrous, tapering to the style; style narrowly conical, 3.5–4 mm long, glabrous. Fruit narrowly obovoid, 1.2–2 cm long, 0.7–1 cm wide, fleshy, black, glabrous; style persistent, 3–3.5 mm long, with a broad base, glabrous. Seed usually 1, ellipsoid, 9–15 mm long, 6–8 mm wide, 5–7 mm thick; seed scar more than half length of seed, *c.* 1 mm wide. *Blush coondoo.*

***Additional selected specimens examined*: Queensland.** Cook District: Round Mountain, Embley Range, Silver Plains, Jul 1997, *Forster PIF21387 et al.* (BRI); TR 14 McIlwraith Range, Sep 1974, *Hyland 3092* (BRI, L). North Kennedy District: Seaview Range, Waterview Creek, Dec 2002, *Ford 3732 & Holmes* (BRI); Taravale, Coane Range, E of the Paluma – Taravale Road, Nov 2001, *Ford AF3090 & Holmes* (BRI); Mt Storth, SE of Townsville, Nov 1995, *Cumming 13816* (BRI); Mt Aberdeen NP, W of Bowen, May 1992, *Forster PIF9975 et al.* (BRI); Headwaters of Dryander Creek, Mt Dryander, Oct 1969, *Webb & Tracey 1008* (BRI); SFR 299 Conway, Cedar Creek, May 1975, *Hyland 4244RFK* (BRI). South Kennedy District: SF 652 Cathu, North Road, Clarke Range, Feb 2004, *Forster PIF30011 et al.* (BRI); Dalrymple Heights, Jul 1947, *Clemens s.n.* (BM, BRI [AQ34414], G, K, L); Clarke Range, Eungella NP, lookout 1 km S of Mt David, Apr 1991, *Telford 11174 & Rudd* (BRI). Port Curtis District: Shoalwater Bay, Mt Parnassus sector, May 1999, *Brushe JB1876 & Brushe* (BRI); Upper reaches of Sawpit Creek, Grevillea Range, 14 km SSE of Lowmead, Jun 1995, *Bean 8712* (BRI); Resumption LA, SF 391 Bulburin, Dec 1993, *Forster PIF14544 et al.* (BRI). Wide Bay District: Eel Creek, 16 km S of Biggenden, Jul 1981, *Young 395 & Randall* (BRI); near Noosa Heads, Aug 1956, *Blake 20037* (BRI). Moreton District: Mt Eerwah, 4 km W of Eumundi, Jan 1985, *Sharpe 3706 & Tan* (BRI), *Sharpe 3707 & Tan* (BRI). **New South Wales.** Mooball SF, near Burringbar, Jun 1947, *Ruttley s.n.* (NSW41821); Brunswick River upstream from Pacific Highway, May 1977, *Floyd 378* (BRI).

***Distribution and habitat*:** *Pleioluma queenslandica* is endemic to north-eastern Australia and occurs from the McIlwraith Range, north Queeensland to the Brunswick River, north-east New South Wales (**Map 7**) in various forms of notophyll and microphyll vineforest including riverine forest and ecotones with eucalypt forest.

***Phenology*:** Flowers have been recorded from May to February and fruit from June to March.

8. Pleioluma singuliflora (C.T.White & W.D.Francis) Swenson, *Taxon* 62: 765 (2013); *Sideroxylon singuliflorum* C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 37: 161, Pl. 7 (1926); *Pouteria singuliflora* (C.T.White & W.D.Francis) Baehni, *Candollea* 9: 316 (1942); *Planchonella singuliflora* (C.T.White & W.D.Francis) P.Royen, *Blumea* 8: 345, fig. 34 (1957); *Beccariella singuliflora* (C.T.White & W.D.Francis) Swenson, Bartish & Munzinger, *Cladistics* 23: 221 (2007). **Type:** Queensland. Cook District: Bellenden Ker, near the summit of Central Peak, January 1923, *C.T.White s.n.* (holo: BRI [AQ022593]; iso: A *n.v.*, K, MEL).

***Illustrations*:** van Royen (1957: 346, fig. 34 [as *Planchonella singuliflora*]); Cooper & Cooper (2004: 512); Hyland *et al.* (2010) [latter two as *Pouteria singuliflora*].

Shrubs or trees to 10 m high. Twigs appressed sericeous. Leaves with petiole flattened or channelled above, 3–15 mm long, sparsely puberulous; lamina narrowly obovate or oblanceolate, 1.5–13 cm long, 0.8–3.5 cm wide, apex bluntly acuminate or acute to rounded, base acute or shortly attenuate, appressed trichomes present on young foliage, soon glabrous above and below, margins recurved; secondary veins 4–9 pairs; tertiary veins horizontal near midvein, obliquely to laxly reticulate in the distal part, scarcely visible. Flowers 1(–2), axillary; pedicels terete, 15–40 mm long. Calyx lobes broadly or depressed ovate, 4–5.5 mm long, on outside glabrescent, inner sepals appressed pubescent near the middle, on inside sericeous, margin ciliate. Corolla tube 6–6.5 mm long, lobes oblong, 4–5.5 mm long, margin ciliolate. Stamens 3–3.5 mm long; filaments 1.7–2 mm long, attached near the middle of the tube; anthers 1.9–2.2 mm long. Staminodes oblong, *c.* 2 mm long, obliquely truncate at apex. Disk indistinct, with short trichomes at base of ovary. Ovary depressed ovoid, *c.* 1.5 mm long, sericeous at base, style conical, 7–8.2 mm long, glabrous. Fruit ellipsoid, 2–3 cm long, 0.8–1 cm wide, fleshy, glabrous or nearly so; style persistent, 6.5–7 mm long with an expanded and glabrous base. Seeds 1(–2), ellipsoid, 13–16 mm long, 3.5–4 mm wide, 6–7 mm thick; seed scar up to 12 mm long and 0.5–1 mm wide.

***Additional selected specimens examined*: Queensland.** Cook District: TR165 Pieter Botte LA, May 1977, *Hyland 9358* (BRI); VCL Noah, Upper Noah Creek, May 1977, *Hyland 9353* (BRI); Thornton Peak, Nov 1973, *Hartley 14033* (BRI, CANB, L); TR143 Zarda LA, near Zarda clearing, Sep 1973, *Hyland 2895RFK* (BRI, CANB); SFR 310, Upper Goldsborough LA, Mar 1978, *Gray 922* (BRI); Mt Bellenden Ker, Jun 1969, *Smith 14616* (BRI, L); Wooroonooran NP, Mt Bellenden Ker summit, Dec 2000, *Forster PIF26517 et al.* (BRI); *ibid*, Dec 2001, *Forster PIF27946 et al.* (BRI); E Bartle Frere, Oct 1994, *Hunter JH2184* (BRI); Bellenden Ker Range, Mt Bartle Frere NW Peak, May 1991, *Telford 11402 & Rudd* (BRI); NPR 904, Wooroonooran, just S of tower No. 9, Mt Bellenden Ker cableway, Jan 2005, *Ford 4547 & Metcalfe* (BRI); Bellenden Ker, Nov 1972, *Hyland 6573* (BRI); SFR 310, Bellenden Ker LA, Nov 1975, *Dockrill 1085* (BRI); Centre Peak near TV tower, summit of Bellenden Ker, Nov 1972, *Webb & Tracey 10800* (BRI); Mt Bartle Frere, May 1955, *Volk 1010* (BRI); E Bartle Frere, Oct 1994, *Hunter JH2184* (BRI).

***Distribution and habitat*:** *Pleioluma singuliflora* is endemic to the Wet Tropics bioregion of north-east Queensland and occurs in and around the Daintree NP from Mt Pieter Botte to west of Mossman and in Wooroonooran NP (**Map 8**), in upland and montane rainforest above 450 m altitude.

***Phenology*:** Flowers have been recorded from September to May and fruit from May and October.

9. Pleioluma xerocarpa (F.Muell. ex Benth.) Swenson, *Taxon* 62: 765 (2013); *Achras xerocarpa* F.Muell. ex Benth., *Fl. Austral.* 4: 281 (1868); *Sideroxylon xerocarpum* (F.Muell. ex Benth.) F.Muell., *Syst. Cens. Austral. Pl.* 91 (1883); *Planchonella xerocarpa* (F.Muell. ex Benth.) H.J.Lam, *Bull. Jard. Bot. Buitenzorg* ser. 3, 7: 218 (1925); *Sersalisia xerocarpa* (F.Muell. ex Benth.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Beccariella xerocarpa* (F.Muell. ex Benth.) Aubrév., *Adansonia* ser. 2, 3: 335 (1964); *Pouteria xerocarpa* (F.Muell. ex Benth.) Baehni, *Boissiera* 11: 58 (1965). **Type:** Queensland. Cook District: Murray River [Rockingham Bay], 22 February 1867, *J. Dallachy s.n.* (lecto: MEL 233064 [here selected specimen 'B' on LHS of sheet]).

***Illustration*:** Hyland *et al.* (2010) [as *Pouteria xerocarpa*].

Trees to 23 m high, commonly gynomonoecious. Twigs sericeous. Leaves with petiole channelled above, 10–35 mm long, sericeous; lamina oblanceolate or elliptic, 7–16 cm long, 2–5 cm wide, apex acuminate or acute, base acute or attenuate, appressed trichomes *c.* 1 mm long present on young foliage, soon glabrous above, glabrescent below; margins flat; secondary veins 7–16 pairs; tertiary veins oblique, almost invisible. Flowers 1–3, axillary; pedicels 6–12 mm long, felted. Calyx lobes broadly ovate or depressed ovate, 3–4.2 mm long; appressed pubescent and glabrescent outside, sericeous inside. Corolla 5–6 mm long; tube 3–4 mm long, lobes suborbicular or oblong-obovate, 1.8–2.5 mm long, margin mostly entire. Stamens 3–4 mm long (vestigial or completely reduced in female flowers); filaments 2–2.7 mm long, attached near the base of the corolla tube; anthers 1–1.3 mm long. Staminodes oblong, *c.* 1.5 mm long. Disk inconspicuous, sericeous. Ovary ovoid, *c.* 2 mm long, sericeous at base, style conical, 4–4.5 mm long. Fruit ellipsoid, 1.8–2.5 cm long, 1–1.3 cm wide, fleshy, black; style persistent, 2–4 mm long with an expanded and appressed pubescent base. Seed 1, obovoid or ellipsoid, 13–16 mm long, 3.5–5 mm wide, 5–7 mm thick; seed scar more than half length of seed, *c.* 1 mm wide.

***Additional selected specimens examined*:** **Queensland.** Cook District: McIvor River N of Cooktown, in 1962, *Webb & Tracey 7793* (BRI); Hope Vale Aboriginal Reserve, 5.7 km NE of Hope Vale Community, Nov 1993, *Fell DGF3830 & Stanton* (BRI); Mt Cook, NP 142, 0.2 km NNE of Mt Cook summit, Feb 1993, *Fell DGF2832 & Stanton* (BRI); 4.5 km along Mt Misery Telecom track from intersection with Normanby Tin Mine track, Nov 1989, *Jessup GJD2876 et al.* (BRI); Daintree NP, NW of Black Mountain, May 1998, *Forster PIF22885 et al.* (BRI); Baileys Creek, N of Daintree River, in 1962, *Webb & Tracey 6481* (BRI); Rex Range, Dec 1988, *Sankowsky 964 & Sankowsky* (BRI); SFR 310, Goldsborough LA, Jan 1982, *Gray 2394* (BRI); Juara Creek between Kairi and Danbulla, Aug 1947, *Smith 3349 & Webb* (BRI, K, L); *ibid*, Aug 1948, *Smith 3784* (BRI); Atherton, Rotary Park, Apr 1964, *Hyland 3051* (BRI); Yarrabah, *c.* 9 miles [14.4 km] E of Cairns, May 1965, *Martin s.n.* (BRI [AQ34614]); Wyvuri Holding on coastal range of Babinda, Feb 1973, *Stocker 979* (BRI); 1.4 km SE of Cooroo Peak, at the head of Culla Creek, 14 km NW of South Johnstone, Oct 1988, *Jessup GJM2521 et al.* (BRI); El Arish – Mission Beach Road, in 1962, *Webb & Tracey 6784* (BRI). North Kennedy District: Alcock FR, rafting access point No.9, 5.2 km from Tully River camping area, Feb 2002, *Ford AF3282 & Holmes* (BRI); Kirrama Range, W of Kennedy, between Society Flat and Yuccabine Creek, Aug 1947, *Smith & Webb 3216* (BRI); Mt Fox, near Ingham, Nov 1949, *Clemens s.n.* (BRI [AQ34626]); Paluma Range – Dotswood Holding, Jun 1974, *Hyland 7282* (BRI, L); Bluewater Range, WNW of Townsville, Nov 1996, *Cumming 15320* (BRI); Mt Spec forestry camp, Nov 1933, *Francis s.n.* (BRI [AQ34619]).

***Distribution and habitat*:** *Pleioluma xerocarpa* is endemic largely to north-east Queensland and occurs from the McIvor River, Cooktown to Paluma Range (**Map 12**) in mostly notophyll vineforest.

***Phenology*:** Flowers have been recorded from August to April and fruit from August to December.

8. PLANCHONELLA

Planchonella Pierre (*nom. cons.*), *Not. Bot. Sapot.* 34 (1890). **Type:** *P. obovata* (R.Br.) Pierre (*type cons.*).

Shrubs or trees, hermaphrodite or gynomonoecious. Leaves spirally arranged, entire; stipules absent. Secondary venation mostly brochidodromous or eucamptodromous; intersecondaries rarely present. Tertiary venation mostly reticulate (areolate venation absent). Inflorescence axillary, fasciculate. Flowers (4–)5(–6)-merous, sometimes with just an extra corolla lobe, bisexual or female. Sepals in one whorl, free, quincuncial, mostly glabrous inside, persistent in fruit. Corolla tubular, the tube as long as or longer than the lobes, lobes erect, often widening slightly near apex. Stamens inserted just below the orifice of the tube, glabrous, included; anthers ovate, basifixed. Staminodes inserted in the corolla sinus, oblong, lanceolate, subulate, or aristate, glabrous. Gynoecium with a conical or slender style, exserted beyond corolla or not prior to anthesis, mostly included at anthesis, often persistent in fruit; apex of style with round stigmatic areas. Fruit a berry, seeds 1–5, laterally compressed, sometimes keeled; testa shining or dull, brown; seed scar linear-oblong, narrow, covering 90%–100% of seed length, rarely shorter; cotyledons thin and foliaceous; radicle exserted below the cotyledon commissure; endosperm copious.

A genus of at least 110 species distributed from Thailand and southern China through Malesia, Australia and the Pacific islands especially New Caledonia but also including Hawaii and French Polynesia (Swenson *et al.* 2013), with 12 species in Australia.

Key to the Australian species of *Planchonella*

1 Calyx glabrous inside or with only a few hairs **2**
1. Calyx pubescent, sericeous, or tomentose inside **10**

2 Tertiary veins mostly oblique or weakly horizontal and joining the midvein, sometimes weakly reticulate; corolla lobes quadrangular, 1.2–1.5 mm long, sometimes with a short acumen; fruit 3.5–8 cm long, 3–8 cm wide . . . . **12. P. xylocarpa**
2. Tertiary veins laxly reticulate or descending towards the midvein parallel to the secondaries (admedial); corolla lobes ovate, suborbicular, oblong, or linguiform, 1.5–4 mm long; fruit to 3 cm long and to 3.6 cm wide. **3**

3 Base of style thickened or broadened in fruit. **4**
3. Base of style not thickened or broadened in fruit. **6**

4 Lamina closely appressed hyaline pubescent below, glabrescent with age; corolla lobes ovate or suborbicular. Ovary 5-lobed, style longer than the mature ovary, 2.2–2.5 mm long . . . . **2. P. asterocarpon**
4. Lamina hairs various but not closely appressed hyaline pubescent below, corolla lobes obovate or oblong or linguiform. Ovary not lobed, style as long as the mature ovary, 1.2–1.5 mm long. **5**

5 Lamina obovate or broadly obovate; petiole mostly 20–40 mm long or more; fruit persistently pubescent or tomentose at least near base, glabrescent with age. **1. P. arnhemica**
5. Lamina narrowly obovate or oblanceolate; petiole mostly 5–15 mm long; fruit glabrous well before maturity . . . . **11. P. pohlmaniana**

6 Corolla lobes more than half as long as tube; style up to 3 mm long. **7**
6. Corolla lobes less than half as long as tube; style 6 mm long or more **9**

7 Lamina glabrescent below; corolla lobes oblong, 3–3.5 mm long. Disk absent; seeds more than 20 mm long . . . . **6. P. eerwah**
7. Lamina persistently appressed pubescent below; corolla lobes ovate, or linguiform, up to 2.2 mm long. Disk present; seeds less than 20 mm long **8**

8 Calyx, twigs and petioles with reddish brown hairs. Fruit sericeous or pubescent; 2–3.5 cm long. Seeds 15–20 mm long; 6–8 mm wide . . . . . **7. P. euphlebia**
8. Calyx twigs and petioles with hyaline or pale brown hairs. Fruit glabrous or nearly so; 1–1.5 cm long. Seeds 8–12 mm long; 2–3.5 mm wide . . . . . **10. P. obovata**

9 Petioles 3–8 mm long; lamina mostly elliptic or lanceolate; secondary veins 60–75° to midvein; tertiary veins descending or parallel-reticulate; calyx lobes 3.5–6 mm long; disk obsolete, ovary sericeous; fruit 1.2–1.8(–2.5) cm long; seeds 10–14 mm long . . . . **8. P. myrsinifolia**
9. Petioles 0.5–2 mm long; lamina mostly obovate or suborbicular; secondary veins 30–60° to midvein; tertiary veins laxly reticulate; calyx lobes 1.5–3.5 mm long; disk adnate to ovary basally, free distally, pubescent; ovary pilose or glabrous; fruit 1–1.5 cm long; seeds 9–11 mm long . . . . **5. P. cotinifolia**

10 Lamina with a persistent dense, appressed indumentum below . . . **9. P. myrsinodendron**
10. Lamina glabrescent or glabrous below **11**

11 Fruit 3–6 cm long, 2.5 cm wide or more; seeds 30 mm long or more, 8–15 mm wide, 13–19 mm thick . . . . **3. P. australis**
11. Fruit up to 2.5 cm long, up to 1.5 cm wide; seeds up to 16 mm long, up to 7 mm wide, 5–8 mm thick . . . . **4. P. chartacea**

1. Planchonella arnhemica (F.Muell. ex Benth.) P.Royen, *Blumea* 8: 397 (1957); *Achras pohlmaniana* var. *latifolia* F.Muell., *Fragm.* 5: 185 (1866); *Achras arnhemica* F.Muell. ex Benth., *Fl. Austral.* 4: 280 (1868); *Sideroxylon arnhemicum* (F.Muell. ex Benth.) F.Muell., *Syst. Census Austral. Pl.* 91 (1883); *Sersalisia arnhemica* (F.Muell. ex Benth.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Pouteria arnhemica* (F.Muell. ex Benth.) Baehni, *Candollea* 9: 286 (1942). **Type:** N Australia, Sea Range, December 1855, *F. Mueller s.n.* (holo: MEL 233052; iso: BRI, K).

Sideroxylon portus-darwini O.Schwarz, *Repert. Spec. Nov. Regni. Veg.* 24: 92 (1927). **Type:** [Northern Territory.] “Port Darwin”, November 1929, *A.J.A. Bleeser 297* (holo: B†; iso: MEL 232970).

Planchonella crocodiliensis P.Royen, *Blumea* 8: 409, 433 (1957). **Type:** Northern Territory. Crocodile Islands, December 1924, *S.H. Wilkins 216* (holo: BM).

[*Planchonella pohlmaniana*, *auct. non* (F.Muell.) Pierre ex Dubard; Wheeler (1992: 269–270 Fig. 77B1–3; Green (1985: 139, 271)].

[*Planchonella pohlmaniana* var. *vestita*, *auct. non* (C.T.White) P.Royen; Dunlop (1987)].

***Illustration*:** van Royen (1957: 397, fig. 43).

Shrubs or trees, to 10 m; bark usually tessellated and corky. Twigs with long and short, straight and tortuous, appressed and suberect, hyaline, pale brown or reddish-brown trichomes, mostly persistent. Leaves with petiole (10–)20–40(–65) mm long; lamina elliptic or oblanceolate or obovate or suborbicular, (4–)5–12(–22) cm long, 1.8–4.5(–11.5) cm wide, apex obtuse, rounded, or acute, base mostly attenuate, indumentum erect and appressed or felted on both surfaces or more or less glabrescent; secondary veins 6–14 pairs, tertiary veins reticulate. Pedicels 2–6 mm long, with pale brown felted trichomes. Calyx lobes suborbicular, 2.5–4 mm long, sericeous or tomentose outside, glabrous inside. Corolla 3–4.5 mm long, lobes oblong, 1.5–2.5 mm long, truncate. Stamens 1–1.2 mm long, filaments geniculate, *c.* 0.3 mm long, anthers 0.7–0.8 mm long; filaments straight and lacking anthers in female flowers. Staminodes oblong or narrowly lanceolate, 0.4–0.6 mm long. Ovary ovoid, 0.7–1 mm long, sericeous; style 2–2.2 mm long, mostly glabrous. Fruit ovoid to subglobose or rarely obovoid, sometimes lobed, ligneous or dry, 2–3 cm long, 1.8–2.7 cm wide, green and ferruginous pubescent, fading and glabrescent with age; style remnant with a broad base. Seeds 3–5, ellipsoid, compressed 10–14 mm long, 7–8 mm wide, 4–5 mm thick, testa brown.

***Additional selected specimens examined*: Western Australia.** Mt Daglish, Eastern Walcott Inlet, West Kimberley, May 1983, *Kenneally 8723* (BRI, PERTH); Upper reaches of Hunter River, W Kimberly coast, May 1996, *Kenneally 11665* (BRI); NE Kimberley, Pim Hill, May 1984, *Chesterfield 370* (BRI, PERTH); *c.* 200 km S of Kulumburu–Gibb River Crossing on road to Kalumburu, Apr 1989, *Halford H33* (BRI, PERTH); 15 km WSW of King George River Falls. 0.7 km N of mining exploration track between Kalumburu & Oombulgari along unnamed track, 24.2 km W of King George River crossing, Jul 1984, *Forbes 2736 et al.* (BRI, PERTH); Gibb River Road, 51 km NNE of Karunjie Station, Jul 1991, *Streimann 80029* (BRI); New York Jump Up on Karunjie track into Karunjie Station Homestead, E Kimberley, Sep 2006, *Mitchell 8625 & Vinnecombe* (BRI). **Northern Territory.** W end of Macadam Range, Feb 1994, *Leach 4163* (BRI); Bathurst Island, *c.* 5 km from Ngurr [Nguirr] on Port Hurd Road, Jan 1994, *Leach 3935 & Dunlop* (BRI); 17 Mile Plain, Melville Island, Sep 1977, *Dunlop 4613* (BRI); Melville Island, Nov 1989, *Russell-Smith 8135 & Peth. [Petherick]* (BRI); Berry Creek area, Nov 1974, *Parker 567* (BRI); *c.* 40 miles [64 km] ENE of Pine Creek Township, Mar 1965, *Lazarides & Adams 202* (BRI); El Sharana Mining Camp, Jan 1973, *Martensz AE387 & Schodde* (BRI, K); 12 km SSW of Cooinda on Pine Creek Road, May 1980, *Lazarides 8863* (BRI); 26 km S of Cooinda, Jun 1980, *Craven 6371* (BRI); 2 km N of Nabarlek, Apr 1979, *Rankin 2208* (BRI); 16 km SE of Koongarra, Jun 1980, *Craven 6255* (BRI); Ramingining Area NR, Djapidi Dapink Creek, Jul 1998, *Cowie & Dunlop 7861* (BRI); Bickerton Island, South Bay, *Cowie 3920 & Dunlop* (BRI); Anarrama Creek, Groote Eylandt, Sep 1988, *Latz 10924* (DNA).

***Distribution and habitat*:** *Planchonella arnhemica* is endemic to Australia and occurs from the West Kimberley coast, Western Australia to Groote Eylandt, Northern Territory (**Map 13**) in open *Eucalyptus miniata/E. tetrodonta* woodland and on the edge of semideciduous notophyll vineforest and deciduous vinethickets.

***Phenology*:** Flowers have been recorded from October to January; fruit from June to September.

***Notes*:** There appear to be at least two forms of *Planchonella arnhemica*, the typical form with appressed rather sericeous indumentum that does not persist for long and a large-leaved form with erect more persistent hairs. The fruit of the broad-leaved form is also more persistently hairy. Field studies would be required to determine if infraspecific taxa could be recognised. The leaves on the type of *P. crocodiliensis* are of new growth and appear to be not fully formed.

2. Planchonella asterocarpon (P.Royen) Swenson, Bartish & Munzinger, *Cladistics* 23: 222 (2007); *Planchonella pohlmaniana* var. *asterocarpon* P.Royen, *Blumea* 8: 395, 432, fig. 42 e & f (1957); *Pouteria asterocarpon* (P.Royen) Jessup, *Austrobaileya* 6: 163 (2001). **Type:** Queensland. Cook District: Atherton district, *s.dat.*, *L. Kemp s.n.* (holo: BRI [AQ22582]).

Pouteria sp. (Atherton L.Kemp AQ22582); Jessup (2002).

***Illustrations*:** van Royen (1957: 397, fig. 42e & f; as *P. pohlmaniana* var. *asterocarpon*); Cooper & Cooper (2004: 509); Hyland *et al.* (2010).

Trees to 35 m high. Twigs appressed pubescent. Leaves with petiole 10–28 mm long, lamina elliptic, oblanceolate or obovate, 6–12 cm long, 2–6 cm wide, apex acute, rounded or obtuse, base attenuate, glabrescent or glabrous above, with persistent appressed hyaline trichomes below; secondary veins 9–14 pairs; tertiary veins reticulate. Pedicels 5–8 mm long, with dense appressed pale brown trichomes. Calyx lobes suborbicular or depressed obovate, 3.5–4 mm long, with appressed pale brown trichomes outside, glabrous inside. Corolla 5–6 mm long, lobes depressed ovate or suborbicular, 1.5–1.8 mm long. Stamens 1–1.3 mm long, filaments geniculate, 0.6–0.8 mm long, anthers 0.8–1mm long. Staminodes linear, *c.* 0.7 mm long. Ovary depressed ovoid, *c.* 1.3 mm long, pilose; style 2.2–2.5 mm long, glabrous. Fruit subglobose, fleshy or dry, 5-angular when dry, 1.5–2.5 cm long, 1.5–2.5 cm wide, reddish-brown, glabrous; style remnant with a broad base. Seeds mostly 5, ellipsoid, compressed, 10–13 mm long, 3–4 mm wide.

***Additional selected specimens examined*:** **Queensland.** Cook District: Tolga Scrub, Aug 1968, *Hyland 1774* (BRI); *ibid*, Aug 1968, *Hyland 1842* (BRI); 1 km W of Putts Mt, Gadgarra SF, Apr 1995, *Horton SH1121* (BRI); SFR 194, Western, Jan 1982, *Gray 2389* (BRI); *ibid*, Oct 1984, *Gray 3661 & 3662* (BRI); Scrubby Creek, May 1971, *Stocker 714* (BRI); Crater, Aug 1969, *Hyland 2407* (BRI); Upper reaches of Barron River, Aug 1941, *Dawson s.n.* (BRI [AQ34544]). North Kennedy District: SFR 194, Apr 1968, *Hyland 1442RFK* (BRI); Keough's scrub (Evelyn), Por. 52v, Parish of Herberton, Sep 1971, *Hyland 5521* (BRI); Misty Mountains, Coolmoon [Koolmoon Creek] Headwaters, near Ravenshoe, Nov 2004, *Bartish 25 & Ford* (BRI); SFR 251, Koolmoon LA, 1.5 km S of Coochimbeerum Road, May 2001, *Ford AF2863* (BRI).

***Distribution and habitat*:** *Planchonella asterocarpon* is endemic to the Wet Tropics bioregion of north-east Queensland where it occurs on the Atherton Tableland and surrounding mountains from Tolga to south of Ravenshoe (**Map 15**) in mesophyll and notophyll vineforest at 900 to 1150 m altitude.

***Phenology*:** Flowers have been recorded in January and fruit from August to October.

***Notes*:** Van Royen (1975) described the branches and leaves as glabrous but on the type and all other specimens seen they are closely appressed pubescent, but the trichomes are not visible without magnification.

3. Planchonella australis (R.Br.) Pierre, *Not. Bot. Sapot.* 36 (1890); *Achras australis* R.Br., *Prodr. Fl. Nov. Holland.* 530 (1810); *Sapota australis* (R.Br.) A.DC., *Prodr. [A. P. de Candolle]* 8: 175 (1844); *Sideroxylon australe* (R.Br.) Benth & Hook.f. ex F.Muell, *Syst. Census Austral. Pl.* 92 (1883); *Sersalisia australis* (R.Br.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Pouteria australis* (R.Br.) Baehni, *Candollea* 9: 308 (1942); *Xantolis australis* (R.Br.) Baehni, *Boissiera* 11: 22 (1965). **Type:** [New South Wales.] Hunter's River, October 1804, *R. Brown [Bennett no.2824]* (lecto: K, *fide* van Royen 1957: 301; isolecto: BM, E, G).

Sersalisia glabra A.Gray, *Proc. Amer. Acad. Arts* 5: 327 (1862). **Type:** New South Wales. Wollongong, United States Exploring Expedition under the command of Capt. C. Wilkes, in 1840, *W. Rich s.n.*? (holo: US).

***Illustrations*:** Francis (1951: 354 & 355); van Royen (1957: 200, fig. 20); Harden *et al.* (2013).

Trees to 45 m high. Twigs glabrescent. Leaves with petiole 3–15 mm long; lamina elliptic to oblanceolate or obovate, 5–15 cm long, 2–6 cm wide, apex acuminate to rounded; secondary veins 10–14 pairs; tertiary veins reticulate. Pedicels (4–)8–15 mm long. Calyx lobes broadly ovate, 3.5–5 mm long, with appressed trichomes both sides, less densely so inside. Corolla 5–7.5 mm long, lobes suborbicular or broadly elliptic, 3–4 mm long. Stamens 5, 2–3 mm long, filaments *c.* 2.5 mm long, anthers 2–2.5 mm long; staminodes subulate 2 mm long. Ovary broadly or depressed ovoid, 1–1.2 mm long, obscurely 5-lobed, sericeous; style cylindrical, 5-ribbed, 4–6.5 mm long, glabrous except at base. Fruit ovoid, 3–5.2 cm long, 2.5–4.5 cm wide, dark purple to black, nearly glabrous. Seeds 1–5, ellipsoid, laterally compressed, 30–40 mm long, 8–11 mm wide, 13–16 mm thick, testa brown, shining part covering most of seed. *Black apple*, *wild plum*, *bulletwood.*

***Additional selected specimens examined*:** **Queensland.** PORT CURTIS DISTRICT: 26 km W of Agnes Water, TR 102, Nov 1996, *Thompson MIR357 & Price* (BRI); Bulburin SF 67, Old Forestry Barracks Area, 9 km E of Builyan, Oct 1989, *Gibson 1135* (BRI); Mt Fort William, Kalpowar SF 95, Sep 1989, *Forster PIF5768 & Bean* (BRI). BURNETT DISTRICT: Cania Gorge NP, Russell Gully, 26 km NE of Monto, Mar 1997, *Kampf s.n. et al.* (BRI [AQ658250]); Walla Range, Nov 1992, *Randall 759* (BRI). WIDE BAY DISTRICT: Kin Kin area, 14 km N of Pomona, Beenham Range, former W.D.Francis farm, Sep 2002, *Forster PIF28903 et al.* (BRI); Old Ceylon Road 6 km SW of Cooroy, Dec 1993, *Bean 7134* (BRI); Mary Cairncross Scenic Reserve, Blackall Range, 3 km SE of Maleny, Dec 2004, *Forster PIF30408 et al.* (BRI). MORETON DISTRICT: Neurum Creek Track Mt Mee SF, Nov 1993, *Grimshaw 217 & Franks* (BRI); Mt Tamborine, Panorama Point area, Gold Coast City Council Conservation Area, Nov 2011, *Forster PIF38392 & Leiper* (BRI); Boonah District, end of Hansons Road, near Milbong, 0.4 km E of Boonah/Ipswich road, Sep 1984, *Bird s.n. & Collins* (BRI [AQ395961]); Lever's Plateau, McPherson Range, *c.* 25 km SE of Rathdowney, Sep 1977, *Bird s.n.* (BRI [AQ254377]); Lamington National Park, Nov 1942, *White 11885* (BRI). **New South Wales.** Dorrigo SF, Oct 1930, *White 7512* (BRI); Shelly Beach, *c.* 2 miles [3.2km] S of Port Macquarie, Dec 1971, *Thurtell 3821 & Coveny* (BRI, L); Seal Rocks, 20 miles [32 km] E of Bulahdelah, Aug 1964, *Briggs s.n.* (NSW 636336); Ash Island, Hunter River, Oct 1903, *Maiden s.n.* (NSW 18062); Bulli, in 1885, *Kirton 63* (MEL).

***Distribution and habitat*:** *Planchonella australis* is endemic to Australia and occurs in south-east Queensland and eastern New South Wales from Bulburin SF near Gladstone to the Illawarra District, on the south coast of New South Wales (**Map 14**) in mostly notophyll vineforest up to 900 m altitude.

***Phenology*:** Flowers have been recorded from October to February and fruit from September to December.

***Typification*:** Van Royen (1957: 301) stated "Type specimen: *Brown 2824* in K" that can be considered an effective lectotypification.

4. Planchonella chartacea (F.Muell. ex Benth.) H.J.Lam, *Bull. Jard. Bot. Buitenzorg* ser. 3, 7: 217 (1925); *Achras chartacea* F.Muell., ex Benth., *Fl. Austral.* 4: 281 (1868); *Sideroxylon chartaceum* (F.Muell. ex Benth.) F.Muell., *Syst. Census Austral. Pl.* 91 (1883); *Sersalisia chartacea* (F.Muell. ex Benth.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Beccariella chartacea* (F.Muell. ex Benth.) Aubrév., *Adansonia* ser. 2, 4: 232(1964); *Pouteria chartacea* (F.Muell. ex Benth.) Baehni, *Boissiera* 11: 59 (1965). **Type:** Queensland. NORTH KENNEDY DISTRICT: Tamoshanter [Tam O'Shanter] Point, February 1865 & 15 August 1865, *Green per J. Dallachy s.n.* (syn: BRI, K, MEL, NSW).

***Illustrations*:** Cooper & Cooper (2004: 509); Hyland *et al.* (2010); Harden *et al.* (2013).

Shrubs or trees to 35 m high. Twigs angular, glabrous or sparsely hyaline sericeous with appressed trichomes. Leaves with petiole 7–12 mm long; lamina oblanceolate or obovate, (4–)9–20 cm long, (1.5–)3–6 cm wide, apex acuminate, base attenuate; secondary veins 7–15 pairs, tertiary veins reticulate. Pedicels (4–)5–8 mm long, hyaline or pale brown sericeous. Calyx lobes broadly ovate, 2.5–3 mm long, acute or obtuse, sericeous on outside and inside. Corolla 3.5–4.5 mm long, lobes 5, oblong or quadrangular, 1–1.5 mm long. Stamens 5, *c.* 1.5 mm long, filaments sinuously curved, *c.* 1 mm long, anthers 0.8–1 mm long. Staminodes oblong or slightly tapered to apex, 1–1.5 mm long. Disk surrounding base of ovary, ferruginous pilose; ovary subglobular, 0.7–0.8 mm long, glabrous; style conical, 5-ribbed, *c.* 1.5 mm long, glabrous. Fruit subglobose, broadly ellipsoid or obovoid, with an apical depression around the style remnant, 3–5 lobed only when dry, 1–2.2 cm long, 0.7–1.5 cm wide, red to black. Seeds 1–5, ellipsoid, laterally compressed, 9–14 mm long, 3–4 mm wide, 5–6.3 mm thick, testa dark brown, shining part covering most of seed. *Thin-leaved coondoo.*

***Additional selected specimens examined*:** **Queensland.** COOK DISTRICT: Carnegie Range, 19.5 km NE of Bamaga, Feb 1994, *Fell DGF3976 et al.* (BRI); Burster Creek, 3 km SW of Bamaga, Jun 1988, *Forster PIF4461 & Liddle* (BRI); 10.5 km W of Captain Billy Landing, 91.3 km SSE of Bamaga, Heathlands D and O Reserve, Oct 1993, *Fell DGF3790 & Stanton* (BRI); Bolt Head, Temple Bay, Jun 1996, *Forster PIF19412* (BRI); NPR 8, Parish of Weymouth, Jan 1982, *Hyland 11560* (BRI); Home Rule, Jul 1995, *Forster PIF17279 & Figg* (BRI); SFR 933, Trinity, Little Pine LA, Dec 1987, *Hyland 13381* (BRI); Wyvuri Holding, Aug 1973, *Stocker 1021* (BRI); *ibid*, Nov 1987, *Hyland 13305* (BRI, CNS); Tropical Trials Unit, Pin Gin Hill, Jul 1980, *Gray 1755* (BRI); *ibid*, Feb 1981, *Gray 1907* (BRI). NORTH KENNEDY DISTRICT: Hinchinbrook Island, Aug 1975, *Sharpe 1703* (BRI); SF 299 Conway, Brandy Creek Road, 8 km SSE of Airlie Beach, Feb 2004, *Forster PIF29973 et al.* (BRI). SOUTH KENNEDY DISTRICT: Scawfell Island NP, 50 km ENE of Mackay, Nov 1986, *Batianoff 6214 & Krieger* (BRI). PORT CURTIS DISTRICT: Shoalwater Bay, Mt Parnassus sector, Bluewater Creek, May 1999, *Brushe JB1877 et al.* (BRI). WIDE BAY DISTRICT: Dundowran Beach, Sep 1991, *Telford 11339* (BRI). MORETON DISTRICT: *c.* 1 km N of Swan Bay, North Stradbroke Island, Feb 1973, *Durrington s.n.* (BRI [AQ9150]); Riverview Parade, Surfers Paradise, Jan 2012, *Forster PIF38507 & Leiper* (BRI). **New South Wales.** Cabarita Beach, Bogangar, Nov 1995, *Bowen s.n.* (BRI [AQ640435]); Oxley River (Middle Arm Creek), just beyond end of Butler's Road NW of Tyalgum, Jul 1981, *Guymer 1575 & Jessup* (BRI); Coolgardie Road, Wardell Nov 1983, *Floyd AGF2018* (BRI, NSW).

***Distribution and habitat*:** In Australia *Planchonella chartacea* occurs from Cape York, Queensland to Wardell on the Richmond River, northeast New South Wales (**Map 16**), mostly in coastal and subcoastal notophyll vine forest. It also occurs in eastern Malesia including Papua New Guinea.

***Phenology*:** Flowers have been recorded from October to May and fruit from May to December.

5. Planchonella cotinifolia (A.DC.) Dubard, *Ann. Mus. Colon. Marseille* ser. 2, 10: 56 (1912); *Hormogyne cotinifolia* A.DC., *Prodr. [A.P. de Candolle]* 8: 176 (1844); *Sersalisia cotinifolia* (A.DC.) F.Muell., *Fragm.* 5: 161 (1866); *Achras cotinifolia* (A.DC.) F.Muell., *Nuovo Giorn. Bot. Ital.* 3: 31 (1871); *Sideroxylon cotinifolium* (A.DC.) Engler, in Engler & Prantl, *Nat. Pflanzenfam. Nachtr. [Engler & Prantl]* 4(1): 276 (1897); *Pouteria cotinifolia* (A.DC.) Baehni, *Candollea* 9: 377 (1942); *Xantolis cotinifolia* (A.DC.) Baehni, *Boissiera* 11: 22 (1965). **Type:** [Queensland.] Shaded forests on the mountains at Moreton Bay, 28° S, in 1827, *A. Cunningham 545* (holo: G-DC; iso: BM, K).

***Illustrations*:** van Royen (1957: 295, fig. 18); Harden *et al.* (2013).

Shrubs or trees to 10 m high. Leaves with petiole 0.5–2 mm long; lamina obovate, suborbicular or sometimes elliptic, 0.4–5 cm long, 0.3–3.8 cm wide, apex rounded or obtuse or bluntly acuminate or acute, base attenuate; secondary veins 3–6 pairs, tertiary veins reticulate. Pedicels 3–9 mm long. Calyx lobes broadly ovate, 2–2.5 mm long, obtusely acuminate or rounded, glabrous inside. Corolla 7–8 mm long, lobes oblong or suborbicular, 1.5–2 mm long, truncate. Stamens up to 2.5 mm long, filaments *c.* 1.5 mm long, anthers 0.8–1 mm long; staminodes oblong, slightly tapered, *c.* 1.5 mm long. Disk adnate to base of ovary, *c.* 1 mm long, free above, pubescent; ovary ovoid-conical, *c.* 0.7 mm long; style narrowly conical, 6–8 mm long. Fruit ellipsoid or ovoid to subglobose, 1–1.5 cm long, 0.5–1.2 cm wide, purple to black; style distinct, persistent, to 7 mm long. Seeds 1–4, ellipsoid, compressed, 9–11 mm long, 3.5–4.5 mm wide, 3.5–4.5 mm thick, testa pale brown or yellowish, shining part covering most of seed.

Two varieties are recognised:

Shoots and twigs with appressed, nearly straight trichomes, glabrescent; lamina glabrescent above and below with sparse appressed hyaline or pale brown trichomes; pedicels 2–11 mm long, puberulous with mostly hyaline trichomes, glabrescent, rarely glabrous; calyx pubescent with appressed hyaline or pale brown trichomes on outside; ovary and style glabrous; fruit with 1 seed . . . . **P. cotinifolia** var. **cotinifolia**

Shoots and twigs with erect, frequently tortuous persistent trichomes; lamina with erect tortuous hyaline or reddish brown mostly persistent trichomes above and below; pedicels 5–12 mm long, pubescent or tomentose with reddish brown trichomes; calyx tomentose on outside with reddish brown trichomes; ovary and style puberulous or pilose; fruit with 1–2(–4)-seeds . . . . **P. cotinifolia** var. **pubescens**

5a. Planchonella cotinifolia (A.DC.) Dubard var. cotinifolia.

Twigs with appressed, nearly straight trichomes, glabrescent. Lamina glabrescent. Pedicels 2–8 mm long, puberulous or pubescent, with straight, appressed hyaline or pale brown trichomes, rarely glabrous. Calyx lobes on outside puberulous with hyaline or pale brown trichomes, glabrescent. Ovary glabrous. Fruit ellipsoid, glabrous, with a single seed. *Small-leaved coondoo.*

***Additional selected specimens examined*: Queensland.** COOK DISTRICT: Schram Scrub; 16.2 km NW of Moreton telegraph station, Bertiehaugh Holding, catchment of Wenlock River, Apr 1994, *Fell DGF4258 & Pritchard* (BRI); Altanmoui Range, Cape Melville NP, 1.6 km E of Flat Hill, 62.6 km NE of Lakefield Ranger Base, May 1994, *Fell DGF4348A & McDonald* (BRI); NPR 166, Black Mountain, Helenvale Road, site 17, May 2004, *Ford 4327 & Hewett* (BRI). NORTH KENNEDY DISTRICT: Daydream Island, Whitsunday Region, Mar 1990, *Batianoff 900322* (BRI). SOUTH KENNEDY DISTRICT: Track to Beachcombers Cove, Cape Hillsborough NP, Nov 1989, *McDonald 4488 et al.* (BRI). PORT CURTIS DISTRICT: South Percy Island, 50 km NE of Arthur Point, Shoalwater Bay, Oct 1989, *Batianoff 11490 et al.* (BRI); Essendean Bridge Crossing, Baffle Creek, Berajondo to Agnes Waters Road, Jan 2000, *Forster PIF25305 & Schmitt* (BRI). BURNETT DISTRICT: Jack Smith's Scrub Conservation Park, 10 km NNW of Murgon, Feb 2008, *Forster PIF33364* (BRI); N end of Elgin Vale SF, SE of Murgon, Feb 2009, *Bean 28552* (BRI); Kingaroy, Apr 1947, *Smith 3106* (BRI); Tower LA, SF 289, Feb 1994, *Forster PIF14845 & Smyrell* (BRI). WIDE BAY DISTRICT: Property of N.Dargusch, Cattermull Avenue, Burnett Shire, Jan 1997, *Forster PIF20199* (BRI); Wrattens FR (formerly SF 639, Manumbar LA), Coast Range, 9 km NE of Gallangowan, Dec 2008, *Forster PIF34726 et al.* (BRI). MORETON DISTRICT: Commissioners View, Blackbutt Range, SF 283, Apr 1990, *Forster PIF6638* (BRI); Redwood Park, E of Toowoomba, Sep 2014, *Jessup 5280 & Bell* (BRI); Splityard Creek, Wivenhoe Dam, Feb 1986, *Hinz s.n.* (BRI [AQ408211]); Rosewood, Feb 1943, *Blake 14814* (BRI, L, K, NSW); *ibid*, Feb 1943, *Blake 14816* (BRI); Kenmore, near Brisbane, near Moggill Creek, Feb 1954, *Blake 15476* (BRI, CANB). DARLING DOWNS: Freestone area, 5.5 km SW of Gladfield, Nov 1977, *McDonald 2004* (BRI). **New South Wales.** Acacia Creek, Jun 1905, *Dunn s.n.* (NSW18127); *ibid*, Mar 1906, *Dunn s.n.* (NSW18128); *ibid*, Jan 1908, *Dunn s.n.* (NSW378977).

***Distribution and habitat*:** *Planchonella cotinifolia* var. *cotinifolia* is endemic to Australia and occurs from the Wenlock River in north Queensland to the Richmond River, north-east New South Wales (**Map 15**), mostly in notophyll vineforest.

***Phenology*:** Flowers have been recorded from January to July and fruit in March.

5b. Planchonella cotinifolia var. pubescens

P.Royen, *Blumea* 8: 296, 428 (1957); *Pouteria cotinifolia* var. *pubescens* (P.Royen) Jessup, *Austrobaileya* 6: 162 (2001); *Planchonella* *pubescens* (P.Royen) Swenson, Munzinger & Bartish, *Taxon* 56: 351 (2007). **Type:** Queensland. Leichhardt District: Duaringa, mixed softwood forest, 23 November 1943, *C.T. White 12462* (holo: L; iso: BRI).

Pouteria cotinifolia var. (Duaringa C.T.White 12462); Jessup (2002).

Illustration: Harden *et al.* (2013) as *P. pubescens*.

Twigs with relatively persistent erect and tortuous trichomes, glabrescent with age. Lamina with tortuous, erect, hyaline to reddish brown trichomes, at length glabrescent. Pedicels 5–12 mm long, trichomes hyaline to reddish brown, tomentose or pubescent. Calyx lobes on outside yellowish-brown tomentose, pale brown or reddish brown trichomes. Ovary yellowish pilose or sometimes glabrous. Fruit ellipsoid or ovoid to subglobose, puberulous below style or glabrous; seeds 1–2(–4). *Yellow lemon*.

Additional selected specimens examined: **Queensland.** Cook District: Royal Arch Tower, *c.* 5 km SW of Chillagoe, Mar 1987, *Clarkson 6840 & McDonald* (BRI, L); Between Chillagoe and Mungana, Jan 1972, *Hyland 5835* (BRI); Undara NP, Wind Tunnel Complex, E of Mt Surprise, Jan 2005, *McDonald KRM3365* (BRI). Burke District: Porcupine Gorge, 53 km NNE of Hughenden, May 1990, *Halford Q232* (BRI). North Kennedy District: Lead Creek, 11 km W of Turulka, Jan 1994, *Forster PIF14694 & Lockyer* (BRI); Forty Mile Scrub NP, 3.8 km N of Mount Surprise Road junction, Kennedy Highway, Mar 1987, *Clarkson 6906 & McDonald* (BRI); 45 km from Greenvale, towards Charters Towers, Feb 1994, *Bean 7470 & Forster* (BRI); Lolworth Range near Mt Stewart, 17 km NW of Homestead, Mar 2004, *Cumming 22205* (BRI). South Kennedy District: 8 km E of Lancewood Station Homestead, Jan 1998, *Thompson 683 & Fox* (BRI); 'Havilah', ridge on right 4 km after Mt Coolon and Nebo road fork, Jul 1993, *Forster PIF13422* (BRI). Mitchell District: Enniskillen, Nov 1943, *White 12368* (BRI). Leichhardt District: 38 miles [60.8 km] W of Nebo, Jun 1962, *Story & Yapp 97* (BRI, CANB, L, MEL, NSW); Springsure, Jun 1915, *Bick s.n.* (BRI [AQ34365], NSW); Palmgrove NP, NW of Taroom, Nov 1998, *Forster PIF23812 & Booth* (BRI). Port Curtis District: Bruce Highway 39 miles [62.4 km] SE of Sarina, Jun 1970, *Moriarty 241* (BRI); Marmor, *Blake 14821* (BRI). Burnett District: Oaky Gorge Creek, N tip of Coominglah SF, *c.* 4.5 km due WSW of Mt Dowgo, Sep 2010, *Pollock ABP2669 & McDonald* (BRI); Wonga Hills, 18 km W of Monogorilby, Nov 1984, *Rodd 4189 & Carlyle* (BRI); Eidsvold, Apr 1918, *Bancroft s.n.* (BRI [AQ34370]). **New South Wales.** Hill near Glen Model Homestead, 29 km NW of Rocky Dam, Aug 1986, *Wilson 78* (K, L, NSW); 'Warivan' 7.4 km from North Star on Warialda Road, Sep 1988, *Moore 8843* (BRI); Turkey Bush Hill, 11 km E of Yallaroi, Feb 1977, *Guymer 978* (BRI).

Distribution and habitat: *Planchonella cotinifolia* var. *pubescens* occurs from the Chillagoe and Mungana area, north Queensland to Yallaroi, New South Wales (**Map 16**), in deciduous vinethickets and low microphyll vineforest and is often associated with brigalow (*Acacia harpophylla* F.Muell. ex Benth.).

Phenology: Flowers have been recorded throughout the year and fruits from April to December.

Notes: Swenson *et al.* (2007a) published a new combination raising this variety to species rank based on the placement of a sample from the voucher specimen *Bartish & Jessup 11* (BRI, S) in their molecular phylogeny. This collection, which was treated in the phylogenetic analysis as representative of *P. cotinifolia* var. *cotinifolia*, was subsequently found to be misidentified. It is *Planchonella myrsinifolia* and is cited in this revision. For this reason I have maintained the status of this taxon as a variety of *P. cotinifolia*. Jessup (2001) placed *P. myrsinoides* as a synonym of *P. cotinifolia* var. *pubescens* but this was later found to be incorrect. See under *P. myrsinifolia*.

6. Planchonella eerwah (F.M.Bailey) P.Royen, *Blumea* 8: 302 (1957); *Sideroxylon eerwah* F.M.Bailey, *Proc. Roy. Soc. Queensland* 10: 52 (1894); *Sersalisia eerwah* (F.M.Bailey) Domin, *Biblioth. Bot.* 89: 509 (1928); *Pouteria eerwah* (F.M.Bailey) Baehni, *Candollea* 9: 408 (1942). **Type:** Queensland. Moreton District: Mt Eerwah, 24 March 1894, *Field Naturalists s.n.* (holo: BRI [AQ22589]).

Illustration: Harden *et al.* (2013).

Shrubs or trees to 8 m high. Twigs glabrescent. Leaves with petiole 5–18 mm long; lamina obovate or oblanceolate, 4–14 cm long, 1.2–6.5 cm wide, apex rounded or rarely bluntly acuminate; secondary veins 5–8 pairs, tertiary veins reticulate. Pedicels 8–15 mm long. Calyx lobes broadly ovate or suborbicular to depressed ovate or depressed obovate, 2.6–3 mm long, mostly glabrous both sides, margins ciliate. Corolla 3.8–4.5 mm long, tube 1.5–1.7 mm long, lobes 5 or 6, oblong, 3–3.5 mm long. Stamens 5 or 6, 2.2–2.8 mm long, filaments 1.5–2 mm long, anthers 1.2–1.5 mm long. Staminodes oblong, tapered to apex, *c.* 2 mm long. Ovary ovoid, *c.* 2.5 mm long, sericeous, tapering to the conical style, 3–3.2 mm long, glabrous. Fruit ellipsoid to obovoid, 3–5.5 cm long, 2–4 cm wide, red, purple to black, nearly glabrous. Seeds 2–5, obovoid-pyriform, sometimes oblique or laterally flattened, 25–30 mm long, 10–15 mm wide, 10–18 mm thick. *Shiny-leaved coondoo, Eerwah plum.*

***Additional selected specimens examined*:** **Queensland.** Moreton District: Gold Creek Road, *c.* 4 km N of North Arm, Feb 1989, *Sharpe 4846* (BRI); Brolga Park, Dulong Road, *c.* 6 km SW of Nambour, Mar 1989, *Sharpe 4851 & Bean* (BRI); 799 Hunchy Road, Hunchy, N of Palmwoods and W of Nambour, Oct 2007, *Hansen s.n.* (BRI [AQ738985]); Carbrook (Logan City) California Creek Park and Recreation Reserve, Riverlakes Country Club Golf Course, May 2003, *McDonald s.n.* (BRI [AQ774853]); Bahrs Scrub, Davidson property, Belivah, S of Beenleigh, Aug 2012, *Forster PIF39005 & Leiper* (BRI); Bahr's Scrub central rainforest patch, *c.* 6 km SW of Beenleigh, Jul 1981, *Guymer 1590 & Jessup* (BRI, NSW); Upper Ormeau Road off Pacific Highway S of Beenleigh, Apr 1984, *Williams 84031 & Bird* (BRI); End of Upper Ormeau Road, S of Beenleigh, Apr 1984, *Bird s.n.* (BRI [AQ431223], NSW); Just SE of Mt Elliot, in 1980, *Bird s.n.* (BRI [AQ344978], NSW); Off Hotham Creek Road, Pimpama, Feb 1992, *Leiper s.n.* (BRI [AQ540255]); Hyperion Place, Willowvale, Jun 2012, *Forster PIF38776 et al.* (BRI); Woollaman Creek, 6 km S of Mt Flinders, Peak Crossing District, Sep 1985, *Bird & Krause s.n.* (BRI [AQ442070], L, NSW); 34 km S of Ipswich, 1 km NW of Ivory Knob end of Woolooman Road, Dec 1987, *Bird & Podlich s.n.* (BRI [AQ435909]); Ivory's Knob, headwaters of Oaky Creek, Jun 1981, *Bird s.n.* (BRI [AQ348210], CANB, K); Wongawallen Conservation Area, W section of Ormeau Scrub, Jun 2004, *Hermon & Leiper s.n.* (BRI [AQ726160]); Headwaters of Oakey Creek on Portion 18V, Parish of Dugandan, close to Ivory's Knob, Jul 1980, *Philips s.n.* (BRI [AQ343783]); Wyaralong, on Boonah to Beaudesert Road, on boundary between 15V and 17V, County Ward, Parish Dugandan, Jul 1980, *Romano s.n.* (BRI [AQ343785]); Veresdale, on property of Mr Robert Harrison, Jun 1993, *Leiper s.n.* (BRI [AQ620229]).

***Distribution and habitat*:** *Planchonella eerwah* is endemic to Australia in southeast Queensland and occurs at Mt Eerwah and vicinity, south and west of Nambour and south of Brisbane between Boonah, Logan City and Pimpama (**Map 15**) mostly in notophyll vineforest or vinethicket.

***Phenology*:** Flowers have been recorded from February to June and September and fruits from June, August and September.

***Conservation status*:** *Planchonella eerwah* is listed as **Endangered** under both the Queensland *Nature Conservation Act 1992* and the Australian *Environment Protection and Biodiversity Conservation Act 1999.*

7. Planchonella euphlebia (F.Muell.) W.D.Francis, *Austral. Rain-Forest Trees, ed. 2*, iv, 448 (1951); *Achras euphlebia* F.Muell., *Fragm.* 7: 110 (1870); *Sideroxylon euphlebium* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 92 (1883); *Sapota euphlebia* (F.Muell.) Radlk. ex Holle, *Thése Erlangen* 17 (1892); *Sersalisia euphlebia* (F.Muell.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Sideroxylon euphlebium* var. *euphlebium*, C.T.White, *Proc. Roy. Soc. Queensland* 50: 81 (1939); *Pouteria euphlebia* (F.Muell.) Baehni, *Candollea* 9: 335 (1942); *Pouteria euphlebia* var. *euphlebia*, Baehni, *Candollea* 9: 335 (1942); *Pouteria euphlebia* var. *typica* Baehni, *loc. cit.*, *nom. inval.*; *Planchonella euphlebia* var. *euphlebia*, P.Royen, *Blumea* 8: 292 (1957); *Xantolis euphlebia* (F.Muell.) Baehni, *Boissiera* 11: 22 (1965). **Type:** Queensland. Rockingham Bay, *s.dat.*, *J. Dallachy s.n.* (syn: MEL 233056, MEL 233057, MEL 233058, MEL 233060; isosyn: BM, BRI).

Sideroxylon euphlebium var. *cryptophlebium* C.T.White, *Proc. Roy. Soc. Queensland* 50: 81 (1939); *Pouteria euphlebia* var. *cryptophlebia* (C.T.White) Baehni, *Candollea* 9: 335 (1942); *Planchonella euphlebia* var. *cryptophlebia* (C.T.White) P.Royen, *Blumea* 8: 294 (1957). **Type:** Queensland. Cook District: Mt. Spurgeon, September 1936, *C.T. White 10655* (holo: BRI; iso: K; A, BM *n.v.*).

***Illustrations*:** van Royen (1957: 293, fig. 17); Cooper & Cooper (2004: 510); Hyland *et al.* (2010).

Shrubs or trees to 25 m high. Twigs, leaves and inflorescence with dark or reddish brown straight, appressed or felted trichomes, glabrescent. Leaves with petiole 8–25 mm long; lamina narrowly obovate, 2.5–10(–18) cm long, 1.2–4.5 cm wide, apex obtuse or rounded or bluntly acuminate (apiculate), base attenuate, persistently appressed pubescent below; margins often recurved; secondary veins 4–8 pairs; tertiary veins frequently admedial. Pedicels 1–2.5 mm long. Calyx lobes broadly ovate, 2.5–3 mm long, with reddish-brown appressed trichomes outside, glabrous inside. Corolla 3.5–4 mm long, lobes 5, broadly ovate, 1.5–2 mm long. Stamens 5, 1.2–1.5 mm long, included, filaments *c.* 0.8 mm long, anthers *c.* 0.8 mm long. Staminodes narrowly lanceolate or triangular, *c.* 1.5 mm long. Disk inconspicuous. Ovary depressed ovoid, *c.* 1.5 mm long, ferruginous sericeous, style conical, 2.5(–3) mm long, sericeous at base. Fruit subglobose, ovoid or ellipsoid, 2–3.5 cm long, 1–3 cm wide, yellow to red, sericeous or pubescent. Seeds 1–5, obliquely ellipsoid, 15–20 mm long, 6–8 mm wide, 6–10 mm thick.

***Additional selected specimens examined*:** **Queensland.** COOK DISTRICT: Top of Mt Hartley, TR 165, Jul 1995, *Forster PIF17328 & Figg* (BRI); SF 144 Mt Windsor Tableland, Jul 1995, *Forster PIF17256 & Figg* (BRI); *ibid*, Nov 1997, *Forster PIF21907 et al.* (BRI); *ibid*, Nov 2004, *Sankowsky 2546 & Sankowsky* (BRI); SFR 143, Parish of Riflemead, North Mary LA, Aug 1984, *Gray 3538* (BRI); SFR 143, Parish of Riflemead, Leichhardt LA, Nov 1985, *Gray 4217* (BRI); Copper Lode Falls Dam Site, on Freshwater Creek, *c.* 6 miles [9.6 km] S of Cairns, Sep 1970, *Gittins 2209* (BRI); SFR 251 Blunder LA, Oct 1978, *Gray 1033* (BRI); SFR 607 Emerald LA, Jun 1980, *Gray 1719* (BRI, CNS); TR 55, Jul 1974, *Hyland 7341* (BRI, L); Lamb Range, Davies Creek Plot, Aug 1971, *Webb & Tracey 11416* (BRI, L); SFR 185, Breach LA, Jun 1971, *Dockrill 137* (BRI, L); SFR 185, Emerald LA, Sep 1971, *O'Farrell 90* (BRI, L); SFR 185, Haig LA, Sep 1981, *Gray 2161* (BRI). NORTH KENNEDY DISTRICT: SFR 605, Dawson LA, Sep 1981, *Hyland 11118* (BRI); Upper reaches of North Zoe Creek, Hinchinbrook Island, Jul 1988, *Fell DF1210 & Swain* (BRI); Hinchinbrook Island, *c.* 2 km NW of Mt Diamantina, Dec 2000, *Kemp TH2557 & Kutt* (BRI); Coast Range, Jul 1868, *Dallachy s.n.* (MEL 233059); Paluma Dam turnoff, Paluma–Hidden Valley road, Jan 2002, *Cumming 20229* (BRI).

***Distribution and habitat*:** *Planchonella euphlebia* is endemic to north-east Queensland from Mt Hartley near Cedar Bay to the Paluma Range (**Map 17**), in mesophyll and notophyll vineforest and upland microphyll forest and thickets and sometimes in adjacent sclerophyll forest, mostly on granite, granodiorite and rhyolite derived soil.

***Phenology*:** Flowers have been recorded from June to October; fruit from November to December.

8. Planchonella myrsinifolia (F.Muell.) Swenson, Bartish & Munzinger, *Cladistics* 23: 222 (2007); *Sersalisia myrsinifolia* F.Muell. (as *'Sarsalisia'*), *Fragm.* 5: 165 (Oct. 1866); *Pouteria myrsinifolia* (F.Muell.) Jessup, *Austrobaileya* 6: 162 (2001). **Type:** [Queensland. MORETON DISTRICT:] Brisbane River, *s.dat.*, *W. Hill s.n.* (lecto: MEL 1058112, *fide* Jessup 2001: 162).

Achras myrsinoides A.Cunn. ex Benth., *Fl. Austral.* 4: 283 (16 Dec. 1868); *Sideroxylon myrsinoides* (A.Cunn. ex Benth.) F.Muell., *Syst. Census Austral. Pl.* 92 (1883); *Sapota myrsinoides* (A.Cunn. ex Benth.) Radlk. ex Holle, *Thése Erlangen* 17 (1892); *Sersalisia myrsinoides* (A.Cunn. ex Benth.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Pouteria myrsinoides* (A.Cunn. ex Benth.) Baehni, *Candollea* 9: 303 (1942); *Planchonella myrsinoides* (A.Cunn. ex Benth.) S.T.Blake ex W.D.Francis, *Austral. Rain-Forest Trees, ed. 2*, 358 (1951); *Xantolis myrsinoides* (A.Cunn. ex Benth.) Baehni, *Boissiera* 11: 23 (1965). **Type:** [Queensland. PORT CURTIS DISTRICT:] Rodd's Bay, May 1819, *A. Cunningham 123* (lecto: K, *fide* Green 1986: 118).

***Illustrations*:** van Royen (1957: 298, fig. 19 [as *P. myrsinoides*]); Hyland *et al.* (2010); Harden *et al.* (2013).

Shrubs or trees to 10 m high. Twigs with erect and appressed trichomes. Leaves with petiole 2–8 mm long: lamina elliptic or lanceolate to ovate, or obovate, 2–10 cm long, 0.8–5 cm wide, apex obtuse, acute or rounded, with appressed or felted trichomes, glabrescent and often soon glabrous above, more persistent below; secondary veins 6–10 pairs; tertiary veins reticulate or frequently admedial. Pedicels 2–14 mm long. Calyx lobes ovate, 3.5–6 mm long, glabrous inside. Corolla lobes oblong but widening distally. Stamens 2.2–2.5 mm long, filaments *c.* 1.2 mm long, anthers 1.3–1.5 mm long. Staminodes linear-lanceolate, truncate or tapered, 2–2.5 mm long. Disk indistinguishable or obsolete; ovary ovoid, 0.8–1 mm long, sericeous; style narrowly conical, 5.5–6 mm long, sericeous in lower half. Fruit ellipsoid to narrowly ovoid, 1.2–1.8(–2.5) cm long, 0.6–0.9 cm wide, purple to black; style distinct, persistent, to 0.7 cm long. Seeds 1(–3) ellipsoid or obovoid, sometimes oblique, 10–14 mm long, 3.5–7 mm wide, 4–7 mm thick.

Two subspecies are recognised:

Twigs and leaves with indumentum of appressed and erect tortuous and straight reddish brown and pale brown trichomes; lamina elliptic, lanceolate or ovate, calyx lobes with appressed and erect trichomes; corolla up to 7.5 mm long . . . . **8a P. myrsinifolia** subsp. **myrsinifolia**

Twigs and leaves with appressed white, pale brown or hyaline mostly straight trichomes, lamina elliptic to obovate, calyx lobes with appressed trichomes, corolla up to 8.2 mm long . . . **8b P. myrsinifolia** subsp. **howeana**

8a. Planchonella myrsinifolia (F.Muell.) Swenson, Bartish & Munzinger subsp. myrsinifolia

Twigs with felted reddish brown erect and appressed trichomes. Leaves: petiole 3–8 mm long; lamina elliptic or lanceolate to ovate, 2–10 cm long, 0.8–5 cm wide, with appressed or felted trichomes, glabrescent and often soon glabrous above, more persistent below. Pedicels and calyx lobes with pale brown or reddish brown felted trichomes. Corolla 6.5–7.5 mm long, lobes 2.1–2.3 mm long. *Blunt-leaved coondoo.*

***Additional selected specimens examined*: Queensland.** Cook District: 2 km E of Mt Gibson, 16 km SSE of Lakeland Downs, West Normanby River catchment, May 1993, *Fell DGF3275 & Daunt* (BRI); Daintree NP, Adeline Creek headwaters, Candlenut Scrub, May 1999, *Forster PIF24570 & Booth* (BRI); SFR 144 (Windsor Tableland), Oct 1971, *Hyland 5535* (BRI); *ibid*, Oct 1971, *Hyland 5537* (BRI); *ibid*, Oct 1971, *Hyland 5553* (BRI, CNS, L). North Kennedy District: Mt Aberdeen NP, W of Bowen, May 1992, *Forster PIF9924 et al.* (BRI); North Gregory, Property of D & R Clarke, adjacent to Dryander SF, Jul 1997, *Champion 1485 & Cali* (BRI). South Kennedy District: Mt Beatrice NP, northern tributary of Catherine Creek, Jul 1993, *Forster PIF13405 & Tucker* (BRI); Hazlewood Gorge, 13 km SSW of Eungella, Dec 1992, *Bean 5275* (BRI); Cut Creek at base of Eton Range, SF 652-658, Mackay, Oct 1986, *Ritchie 52* (BRI). Port Curtis District: Eurimbula NP, S of Middle Creek camping grounds, Nov 2009, *Booth 5414 & Stephens* (BRI); Dennis Martin property, Littlemore, Horseshoe Valley, 8 km from Rushbrook Road turnoff, Jun 1997, *Worthington 1695* (BRI); Rules Beach near Baffle Creek, NW of Bundaberg, Oct 1996, *Bean 11070* (BRI). Burnett District: Southern base of Coongara Rock, SF 1344, 11 km ESE of Coalstoun Lakes, Sep 2002, *Forster PIF28847* (BRI); Jack Smith's Scrub Conservation Park, 10 km NNW of Murgon, Sep 2007, *Forster PIF32988* (BRI); Tessman's Road, 2 km NE of Kingaroy, May 2007, *Forster PIF32495* (BRI). Wide Bay District: The Hummock, *c.* 5 miles [8 km] E of Bundaberg, Oct 1948, *Smith 4103* (BRI); Mt Walsh NP, Palm Valley, Oct 2008, *Forster PIF34330* (BRI); Mt Wolvi near scenic lookout, E of Gympie, Aug 1982, *Jessup 486* (BRI, CANB). Moreton District: Smith's rainforest, Upper Brookfield, 12 km SW of Brisbane, Nov 2004, *Bartish & Jessup 11* (BRI); World's End Pocket, N of Ipswich, Aug 1984, *Bird s.n.* (BRI [AQ395651], L). **New South Wales.** Cherry Tree FR, Richmond Range, Apr 1978, *Floyd AGF894* (BRI); Lismore, in 1892, *Bäuerlen 843* (NSW); Yahoo Island Nature Reserve, Wallis Lake, May 1978, *Clough s.n.* (CANB 597442, image!).

***Distribution and habitat*:** *Planchonella myrsinifolia* subsp. *myrsinifolia* is endemic to mainland Australia where it occurs from the West Normanby River, north-east Queensland to Wallis Lake, south of Forster, New South Wales (**Map 18**), mostly in notophyll and microphyll vineforests and vinethickets.

***Phenology*:** Flowers have been recorded from May to December and fruit in March and from July to December.

8b. Planchonella myrsinifolia subsp. howeana (F.Muell.) Jessup comb. nov.;

Achras howeana F.Muell., *Fragm.* 9: 72 (1875); *Planchonella howeana* (F.Muell.) Pierre, *Notes Bot. Sapot.* 36 (1890); *Sideroxylon howeanum* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 92 (1882); *Sersalisia howeana* (F.Muell.) Domin, *Biblioth. Bot.* 89: 508 (1928); *Pouteria howeana* (F.Muell.) Baehni, *Candollea* 9: 306 (1942). **Type:** Australia. New South Wales. Lord Howe Island, *s.dat.*, *J.P. Fullagar s.n.* [?*32*] (lecto: MEL 242677, *fide* Green 1990: 251; isolecto: E, K).

[*Planchonella reticulata*, *auct. non* (Baill.) Pierre ex Dubard; van Royen (1957: 285), in reference to the Lord Howe Island specimen].

[*Pouteria myrsinoides* subsp. *reticulata*, *auct. non* (Baill.) P.S.Green; Green (1990: 251, 1994: 147), in reference to the Lord Howe Island specimens].

Twigs with appressed pale brown or hyaline trichomes. Leaves: petiole 2–5 mm long; lamina elliptic to broadly obovate, 2.5–8.5 cm long, 0.9–5 cm wide, with mostly appressed trichomes, glabrescent and soon glabrous above, glabrescent below. Pedicels and calyx lobes with pale brown or white appressed trichomes. Corolla 7.5–8.2 mm long, lobes 2.5–2.6 mm long.

***Additional selected specimens examined*: New South Wales.** LORD HOWE ISLAND: Lord Howe Island, in 1898, *King s.n.* (BRI [AQ34445]); *ibid*, May 1920, *Boorman s.n.* (BRI [AQ34607]); Lagoon Road near junction with Middle Beach Road, Jul 2001, *Le Cussan 1170* (BRI); Lagoon Road near War Memorial, Aug 2001, *Le Cussan 1193* (BRI); three quarters way to the summit of Mt Eliza along track, Feb 2002, *Le Cussan 1210* (BRI).

***Distribution and habitat*:** *Planchonella myrsinifolia* subsp. *howeana* is endemic to Lord Howe Island (**Map 18**) where it occurs as a component of low closed forest.

***Phenology*:** Flowers have been recorded in February, May, July and August; fruit from August to November.

***Notes*:** Swenson *et al.* (2007b) reported that their DNA analyses indicated that a broad circumscription of *P. myrsinifolia* to include material from New Caledonia as proposed by Green (1990) was inappropriate and that *P. myrsinifolia* and *P. howeana* are more closely related to each other than either is to *P. reticulata*. The reference to *P. cotinifolia* in their analysis was based on a misidentified voucher specimen which was found to *be P. myrsinifolia* (see in Notes above under *P. cotinifolia*).

9. Planchonella myrsinodendron (F.Muell.) Swenson, Bartish & Munzinger, *Cladistics* 23: 222 (2007); *Chrysophyllum myrsinodendron* F.Muell., *Fragm.* 6: 178 (1868); *Pouteria myrsinodendron* (F.Muell.) Jessup, *Austrobaileya* 6: 163 (2001). **Type:** Queensland. [COOK DISTRICT:] Herbert River, 6 December 1867, *J. Dallachy s.n.* (holo: MEL 233326, MEL 233327, MEL 233328; iso: BM ex herb. Hance).

Planchonella obovoidea H.J.Lam, *Bull. Jard. Bot. Buitenzorg* ser.3, 7: 207, fig. 56 (1925); *Pouteria obovoidea* (H.J.Lam) Baehni, *Candollea* 9: 412 (1942). **Type:** Moluccas. Kai Island, *s.dat.*, *Jaheri 134* (holo: L).

***Illustrations*:** Cooper & Cooper (2004: 510); Hyland *et al.* (2010).

Trees to 35 m high. Twigs densely appressed sericeous, with pale brown, persistent trichomes. Leaves: petiole 8–25 mm long; lamina obovate or elliptic, 5–20 cm long, 2–8.5 cm wide, apex acute or obtuse or rounded, with persistent hyaline appressed trichomes below; secondary veins 4–12 pairs; tertiary veins reticulate or some oblique. Pedicels 3–6 mm long, hyaline or pale brown sericeous. Calyx lobes depressed ovate to suborbicular, 2–2.3 mm long, apices obtuse to rounded, with dense appressed trichomes on outside and slightly less dense inside in the apical half, sparse to glabrous near the base. Corolla 2.5–2.8 mm long, lobes broadly ovate or obovate or suborbicular, 1.5–1.7 mm long, apices obtuse to rounded. Stamens 1.2–1.5 mm long, filaments *c.* 1mm long, anthers *c.* 0.8 mm long. Staminodes lanceolate *c.* 1 mm long. Ovary ovoid, 0.6–0.7 mm long, embedded in the sericeous disk; style conical, 0.4–0.5 mm long, glabrous. Fruit obovoid, 1.8–2.5(–3) cm long, 1–1.5 cm wide, red to purple or black, glabrous or nearly so, apex surrounding base of style remnant enlarged and pale. Seed 1, obovoid, 15–25 mm long, 8–12 mm wide, 8–12 mm thick.

***Additional selected specimens examined*: Queensland.** COOK DISTRICT: Banks Peak, Moa Island, Torres Strait, Jul 2008, *Fell DGF9731 & Stanton* (BRI); Between Lockerbie and Somerset, Sep 1979, *Hyland 3978RFK* (BRI); 1 km E of Kennedy Ridge, Jun 1989, *Forster PIF5416 & Tucker* (BRI); McIvor River, Jul 1972, *Hyland 6257* (BRI); Shiptons Flat, S of Cooktown, Aug 1973, *Moriarty 1428* (BRI); Noah Creek, between Daintree River and Cape Tribulation, Oct 1967, *Hyland 1069* (BRI); Daintree River, Dec 1929, *Kajewski 1433* (BM, BRI, E, K); TR 55, Whyanbeel, Jun 1975, *Hyland 8301* (BRI); SFR 607, Bridle LA, Jul 1982, *Hyland*

11821 (BRI); *ibid*, Aug 1982, *Hyland 11844* (BRI); *ibid*, Dec 1987, *Hyland 13401* (BRI); SFR 310, Goldfield LA, Jan 1982, *Gray 2399* (BRI); SFR 191, Sep 1981, *Gray 2154* (BRI); Etty Bay, Jul 1975, *Risley 178* (BRI, CANB, L); Peeramon on slopes of Mt Quincan, *Blake 15247* (BRI, K). North Kennedy District: Cardwell FR, near Meunga Creek water intake, W of Cardwell, Dec 2003, *Ford AF4249 & Green* (BRI); Mt Fox FR, un-named creek off Mt Fox Road, 7.5 km from Upper Stone River Road, Dec 2004, *Ford 4526* (BRI); SF 299, Conway, Brandy Creek Road, 8 km SSE of Airlie Beach, Feb 2004, *Forster PIF29971 et al.* (BRI); Brandy Creek Road, *c.* 5.5 km E of Shute Harbour Road & 13 km NE of Proserpine, Nov 1985, *Sharpe 4056 & Perry* (BRI). South Kennedy District: Reserve 60 Ossa, Hidden Valley, Cape Hillsborough, May 1975, *Hyland 4283RFK* (BRI, CANB, L); St Helens Gap area, N side of Calen to Mirami Road, N of Mt Ossa T Junction, Sep 1994, *Champion 1133* (BRI); Cherrytree Creek, Nov 1987, *Canning 307* (BRI). Port Curtis District: Byfield, *s.dat.*, *Simmonds 4* (BRI); Water Board Reserve, Baffle Creek, Fingerboard Road, Feb 2016, *Braddick 4336* (BRI).

Distribution and habitat: *Planchonella myrsinodendron* has a wide distribution from Java to Fiji and in north-east Australia where it occurs in Queensland from Torres Strait to Baffle Creek near Miriam Vale (**Map 19**), in semideciduous and evergreen mesophyll and notophyll vineforests.

Phenology: Flowers have been recorded from November to March; fruit from June to November.

Note: The hairs on the inside of the calyx lobes can only be readily seen on dried material, not on dissected material under water. Previous authors have reported the inside of the calyx lobes to be glabrous.

10. Planchonella obovata (R.Br.) Pierre, *Not. Bot. Sapot.* 36 (1890); *Sersalisia obovata* R.Br., *Prodr. Fl. Nov. Holland.* 530 (1810); *Sideroxylon obovatum* (R.Br.) Sm. in *Rees, Cycl.* 32 (1816), *nom. illeg.*; *Achras obovata* (R.Br.) F.Muell. ex Benth., *Fl. Austral.* 4: 283 (1868); *Sapota obovata* (R.Br.) Radlk. ex Holle, *Thése Erlangen* 17 (1892) (*nom. inval.*?); *Pouteria obovata* (R.Br.) Baehni, *Candollea* 9: 324 (Dec 1942). **Type:** New Holland, [Endeavour River] in 1770, *J. Banks & D. Solander s.n.* (holo: BM; iso: MEL, P).

Sideroxylon brownii F.Muell., *Syst. Census Austral. Pl.* 92 (1883), *nom. nov.*, *non Sideroxylon obovatum* Gaertner *nec non* Lamarck.

Illustration: Hyland *et al.* (2010).

Trees or shrubs to 40 m high. Twigs pale reddish-brown sericeous. Leaves: petiole 10–35 mm long; lamina obovate or oblanceolate, 4.5–24 cm long, 1.5–12(–15) cm wide, apex obtuse, glabrous above, hyaline appressed pubescent below; secondary veins mostly 6–11 pairs; tertiary veins reticulate. Pedicels 3–5(–10) mm long, hyaline or brown sericeous. Calyx lobes broadly ovate to depressed ovate, 2–3 mm long; outer ones puberulous to sericeous outside, glabrous on inside, inner ones glabrous both sides, margins more or less ciliate. Corolla lobes, ovate or linguiform, 2–2.5 mm long. Stamens 3–3.7 mm long, filaments 2.5–3 mm long, anthers *c.* 1 mm long. Staminodes mostly rhomboid or oblong with an acute apex, 1–1.2 mm long. Ovary depressed ovoid, 0.8–1 mm long, embedded in the sericeous disk; style conical, 0.8–1 mm long, glabrous. Fruit broadly obovoid or subglobose, sometimes oblique, 1–1.5 cm long, 1–1.5 cm wide, black, glabrous. Seeds mostly 1 or 2 obliquely ellipsoid, 8–12 mm long, 2–3.5 mm wide, 2–3.5 mm thick.

***Additional selected specimens examined*: Queensland.** Cook District: Deliverance Island, NW Torres Strait, Mar 2001, *Waterhouse BMW6125* (BRI); Gabba Island, Torres Strait, Jan 2007, *Waterhouse BMW7509* (BRI); Yorke Island, Torres Strait, Nov 1999, *Wannan 1449 & Weston* (BRI); Jardine River NP #26, 14 km SW of Furze Point, 38.6 km ESE of Bamaga Catchment of the Escape River, Oct 1993, *Fell DGF3626 & Dibella* (BRI); Perry Island, Home Group near Cape Grenville, Nov 1979, *Curtis 6* (BRI); Rocky Isle, *c.* 4.5 km S of Cape Direction, Nov 1987, *Clarkson 7390* (BRI); Lizard Island, Lizard Head, Sep 1988, *Batianoff 10136* (BRI); Daintree NP, Cape Tribulation beach, Oct 2000, *Forster PIF26371 et al.* (BRI); Whyanbeel Creek, near the inlet between Dayman Point and Newell Beach, Oct 1978, *Moriarty 2502* (BRI); Mossman River mouth, Sep 1948, *Smith & Webb 4000* (BRI, L); Southern end of Palm Beach, Oct 1979, *Clarkson 2664* (BRI); Green Island, Sep 1981, *Fosberg 61527* (BRI); Stephans Island, east of beach, east of Cowley Beach, Sep 2010, *Ford 5777 & Bradford* (BRI). North Kennedy District: Coconut Bay, Dunk Island, Nov 1985, *Sharpe 4241* (BRI); Edmund Kennedy NP near Cardwell, Jan 1992, *Bean 3897* (BRI); Cardwell, Sep 1935, *Blake 9669* (BRI); Hinchinbrook

Island, Ramsay Bay, Oct 1986, *Warrian CW7065* (BRI); *c.* 1.2 km NNW of the Orient Creek mouth, *c.* 22 km SE of Ingham, Dec 1995, *Kemp 1759H* (BRI).

***Distribution and habitat*:** *Planchonella obovata* occurs from the Seychelles to southern China, south-east Asia, New Guinea, Solomon Islands and north-east Queensland. In Queensland it occurs from Torres Strait to south of Ingham (**Map 20**) in littoral and estuarine mesophyll and notophyll vineforest, coastal wind shorn thickets and adjacent open forest, commonly on sandy soil.

***Phenology*:** Flowers have been recorded from September to January and fruit from December to March.

11. Planchonella pohlmaniana (F.Muell.) Pierre ex Dubard, *Ann. Mus. Colon. Marseille* ser. 2, 10: 47 (1912); *Achras pohlmaniana* F.Muell., *Fragm.* 5: 184 (1866); *Sideroxylon pohlmaniana* (F.Muell.) Benth. & Hook.f. ex F.Muell., *Syst. Census Austral. Pl.* 91 (1883); *Sapota pohlmaniana* (F.Muell.) F.Muell. ex Holle, *Thése Erlangen* 17 (1892); *Sersalisia pohlmaniana* (F.Muell.) Domin, *Biblioth. Bot.* 89: 506, fig. 174 (1928); *Pouteria pohlmaniana* (F.Muell.) Baehni, *Candollea* 9: 334 (1942); *Planchonella pohlmaniana* var. *pohlmaniana*, P.Royen, *Blumea* 8: 394 (1957). **Type:** Queensland. [North Kennedy District]: Edgecombe-Bay, 19 June 1863, *J. Dallachy s.n.* (lecto: MEL 2280413, *fide* van Royen 1957: 391).

Sideroxylon dugulla F.M.Bailey, *Queensland Agric. J.* 1: 80 (1897); *Sersalisia dugulla* (F.M.Bailey) Domin, *Biblioth. Bot.* 89: 509 (1928); *Pouteria dugulla* (F.M.Bailey) Baehni, *Candollea* 9: 407 (1942). **Type:** Queensland. Cook District: Barron River, May 1897, *E. Cowley KA1* (holo: BRI; iso: BM, K).

Planchonella pohlmaniana var. *vestita* P.Royen, *Blumea* 8: 395, fig. 42 c,d (1957); *Sideroxylon pohlmaniana* var. *vestita* C.T.White *nom. nud.* **Type:** “White 1409 in NSW” *nom. inval.* Art. 391.1 (ICN 2018).

Planchonella pohlmaniana var. (Gilbert River C.T.White 1409); Jessup (2002, 2010, 2015).

***Illustrations*:** van Royen (1957: 392, fig. 42); Cooper & Cooper (2004: 511); Hyland *et al.* (2010).

Trees to 25 m. Twigs with pale reddish brown to hyaline erect or appressed trichomes or glabrous. Leaves: petiole mostly 5–15 mm long, lamina oblong-obovate or oblanceolate, 5–14 cm long, 1.5–4(–6.5) cm wide, apex mostly obtuse or rounded, base attenuate or acutely cuneate; secondary veins mostly 6–13 pairs; tertiary veins laxly reticulate. Pedicels 1.5–4 mm long with appressed or felted trichomes. Calyx lobes suborbicular or ovate (broadly), 2.5–4 mm long, apices obtuse or rounded, with appressed trichomes or rarely glabrous outside, glabrous inside. Corolla lobes 5, oblong or linguiform, 1.5–2.5 mm long, apices rounded or truncate, entire or ciliolate. Stamens 1.2–1.5 mm long, filaments geniculate, *c.* 0.5 mm long, anthers *c.* 1 mm long or barely formed on straight filaments in female flowers. Staminodes narrowly oblong or narrowly lanceolate, 0.6–1 mm long. Disk obsolete; ovary depressed ovoid-conical, *c.* 1 mm long, red-brown pilose, glabrescent; style conical, 1.2–1.5 mm long, glabrous. Fruit globose or subglobose or depressed globose or broadly ellipsoid or broadly obovoid, sometimes slightly 5-angular, fleshy, dry, or ligneous, 1.5–3 cm long, 1.5–3.6 cm wide, green, mostly glabrous well before maturity. Style remnant with a broad base. Seeds 3–5, ellipsoid, compressed, 10–12 mm long 5–9 mm wide and 3–4 mm thick. *Yellow boxwood*, *Engraver’s wood*.

***Additional selected specimens examined*:** **Queensland.** Cook District: Lake Boranto [Bronto] 3 miles [4.8 km] SW of Somerset, May 1948, *Brass 18804* (BRI); Abandoned Shelburne Bay (Nixon) Homestead, Shelburne Bay area, Jun 2008, *Forster PIF33652 & McDonald* (BRI); 0.7 km SW of King Park Ranger Station, Claudie River, Apr 1992, *Fell DF2490* (BRI); SW corner TR9 (Lankelly Creek), Sep 1971, *Hyland 2541RFK* (BRI); *c.* 14 miles [22.4 km] SE of Coen on Laura – Coen Road, Oct 1962, *Smith 12002* (BRI); Archer River, Merapah Station, Sep 1981, *Smyth s.n.* (BRI [AQ346173]); Cape Melville, Sep 1970, *Hyland 4662* (BRI); Dixie – Oriners Road, near Dixie Station, Jul 2008, *McDonald KRM7827 & Wannan* (BRI); Fairview to Kimba Road, 4.9 km W of St George River, Apr 1980, *Clarkson 3181* (BRI); Beside Bells Camp Waterhole on Staaten River, 2 km W of main Staaten River road crossing, Jun 1990, *Neldner 2965 & Clarkson* (BRI); Sandy Creek, NE of Jowalbinna (25 km SSE of

Laura), Jul 1998, *Wannan BSW905 et al.* (BRI); Torwood Homestead, junction of Lynd and Tate Rivers, Dec 1970, *Macdonald 3* (BRI, K); Blue Hills, 'Mt Surprise', Mar 1988, *Champion 379, 380* (BRI); Near northern boundary of Undara NP, Mar 2005, *McDonald 3378* (BRI); Bridle Creek, 19 miles [30.4 km] ESE of Cairns, Nov 1964, *Dansie s.n.* (BRI [AQ34559]); Rockingham Bay, *c.* 10 m [16 km], SE of Tully, Feb 1965, *Everist 7782* (BRI). Burke District: S of Croydon, at entrance to Croydon tip road, Oct 2001, *Johnson s.n.* (BRI [AQ772207]; 'Esmeralda' SE of Croydon, Jul 1954, *Blake 19623* (BRI, DNA). North Kennedy District: 57 km W of Mt Garnet, Jun 1983, *Reay s.n.* (BRI [AQ628238]); Cungulla, 25 km W of Townsville, Apr 1995, *Fensham 1951* (BRI); About 24 miles [38.4 km] due SW of Ayr, Jun 1949, *Smith 4312* (BRI); Mt Abbot, 50 km W of Bowen, Aug 1992, *Bean 4841* (BRI); 8.5 km E of Mt Cooper Homestead, Jun 1992, *Thompson CHA30 & Sharpe* (BRI). South Kennedy District: Collinsville, Jan 1978, *North s.n.* (BRI [AQ259286]). Port Curtis District: N of Yeppoon, Sep 1977, *Batianoff 540 & McDonald* (BRI). Burnett District: Tessman's Road, 2km NE of Kingaroy, May 2007, *Forster PIF32490 & Fechner* (BRI). Moreton District: Fort Bushland Reserve, Oxley, Brisbane, Jan 2015, *Forster PIF41908 et al.* (BRI); 4 miles [6.4 km] S of Canungra on road to Lamington NP, Sep 1970, *Williams* 34553 (BRI, L, K). **New South Wales.** Unumgar SF 540, Mar 1963, *Jones 2369* (CANB, NSW).

***Distribution and habitat*:** *Planchonella pohlmaniana* is endemic to Australia and occurs from Cape York, north Queensland to the Richmond River, north-east New South Wales (**Map 21**) in notophyll and microphyll vineforest and thickets, adjacent eucalypt forest and *Eucalyptus* and *Corymbia* woodland.

***Phenology*:** Flowers have been recorded throughout the year; fruit from September to June.

***Typification*:** Baehni (1942: 334) nominated a specimen in P as the type, as follows: "Australie; Rockingham Bay (F. v. Muell. s.n.! = type", which appears to be, in effect, the choice of a lectotype. On the sheet in the upper right corner of this specimen are two stamps, one stating "Herb. E. Cosson" and on the other "Herb. E. Durand ancien Herb E. Cosson" and elsewhere on the upper and lower halves of the sheet two distinct groups of mounted fragments of specimens with two separate labels, on each of which is written "*Sersalisia*" "Rockingham Bay" and on two accompanying separate pieces of paper "Ex Herb. F. Mueller Pl. Australiensis". The collector was not Mueller, as stated by Baehni, but rather most likely John Dallachy as Mueller never visited Rockingham Bay. Most importantly though, there is no date recorded anywhere on the sheet therefore it is not possible to determine if the specimens were collected prior to publication of Mueller's name *Achras pohlmaniana* or if Mueller saw the specimens prior to publication. The genus name *Sersalisia* is probably a later annotation as none of the syntypes in MEL or replicates of these elsewhere that I have seen bear the genus name *Sersalisia*. The species was formally transferred to *Sersalisia* by Domin (1928). Therefore, as it is not possible to confirm that any of this material was part of the original listed syntypes, I propose that Baehni's choice of a (lecto) type is not valid and should be rejected.

Van Royen (1957) nominated "Dallachy s.n. in MEL" as the (lecto) type but amongst the list of other specimens seen he cites only Dallachy's Edgecombe Bay collection. As there is more than one Dallachy collection amongst the syntypes I have chosen the sheet MEL 2280413 as a subsequent lectotypification as allowed under Art. 9.17 of the ICN (2018).

***Notes*:** Some specimens with more prominent indumentum on the leaves have been annotated as *Planchonella pohlmaniana* var. *vestita* by van Royen but this is a *nomen nudum*. Van Royen (1957) states "Neither Mr Blake from the Brisbane Herbarium nor the present author were able to trace the description of this variety. Nomen nudum?". These and other specimens at BRI have been annotated with the phrase name *Planchonella pohlmaniana* var. (Gilbert River C.T.White 1409). The indumentum on the foliage of *P. pohlmaniana* varies from almost glabrous, mostly on specimens from rainforest in high rainfall areas such as the Atherton Tableland, eastern parts of Cape York Peninsula and southern Queensland, to densely pilose with erect hairs on specimens from open woodland communities around Croydon such as the Gilbert River specimen (*White 1409*). From Central Queensland to around Townsville most specimens exhibit a moderate density of erect and appressed indumentum on the leaves and stems and this includes the type from Edgecombe Bay. The density, form and distribution of the indumentum also varies with the maturity and age of the foliage. *Sideroxylon dugulla* F.M.Bailey represents the nearly glabrous forms of this species. The bark of more mature trees in more seasonally dry communities is often markedly tessellated.

12. Planchonella xylocarpa (C.T.White) Swenson, Bartish & Munzinger, *Cladistics* 23: 222 (2007); *Pouteria xylocarpa* C.T.White, *J. Arnold Arbor.* 31: 111 (1950); *Bureavella xylocarpa* (C.T.White) Aubrév., *Adansonia* sér. 2, 3: 332 (1963). **Type:** Papua New Gunea. New Britain: Broken Bay, Namtambu, May 1945, *K. Mair NGF1883* (holo: BRI; iso: K, L, NSW).

Planchonella ripicola P.Royen, *Blumea* 8: 372–374 (1957). **Type:** Indonesia. Papua: Vogelkop Peninsula, Sorong, Roefei, river NW of village, *c.* 1.5 km from river mouth on riverbank, 20 March 1954, *P. van Royen 3098* (holo: L, iso: A, CANB, K, SING).

***Illustrations*:** van Royen (1957: 373, fig. 38 as *P. ripicola*); Hyland *et al.* (2010).

Trees to 30 m high. Twigs glabrescent. Leaves: petiole 2–5 mm long, lamina elliptic, oblanceolate or obovate, 6–23 cm long, 2.4–10 cm wide, apex bluntly acuminate to obtuse, glabrous above, glabrescent below; secondary veins 6–12 pairs; tertiary veins mostly oblique or weakly horizontal and joining the midvein, sometimes weakly reticulate. Pedicels 5–7 mm long, with sparse appressed trichomes, glabrescent. Calyx lobes suborbicular or ovate, 2–2.5 mm long; outside with appressed trichomes, glabrescent, inside glabrous. Corolla 2–2.5 mm long, lobes quadrangular, 1.2–1.5 mm long, apices truncate or with a short blunt acumen. Stamens 0.8–1 mm long, filaments 0.5–0.6 mm long, anthers *c.* 0.6 mm long. Staminodes narrowly lanceolate, truncate at apex, *c.* 1 mm long. Ovary depressed ovoid, *c.* 0.7 mm long, pilose, style 1.4–1.5 mm long, glabrous. Fruit subglobose, ligneous, 3.5–8 cm long, 3–8 cm wide, green or yellow-green towards base. Seeds 2–5, obliquely ellipsoid, 20–30 mm long, 4–8 mm wide, 8–10 mm thick.

***Additional selected specimens examined*: Queensland.** Cook District: Iron Range NP #8, 1.3 km NE of Mt Tozer, 14.2 km WNW of Lockhart River community, May 1994, *Fell DGF4077 et al.* (BRI); Middle Claudie River scrub, Jul 1993, *Forster PIF13566 et al.* (BRI); Claudie River, Oct 1972, *Hyland 6398* (BRI, CNS, K, L); *ibid*, Jan 1973, *Hyland 6633* (BRI, CNS, K, L); *ibid*, Oct 1980, *Hyland 10795* (BRI); *ibid*, Jan 1982, *Hyland 11508* (BRI); *ibid*, Dec 1982, *Hyland 12422* (CNS); *ibid*, Oct 1972, *Hyland 6425* (CNS); *ibid*, Jul 1972, *Hyland 2608RFK* (BRI); *ibid*, Oct 1973, *Hyland 2952RFK* (BRI); Gordon Creek, 10 km ENE of Mt Tozer, Iron Range NP, May 1992, *Fell DF2542* (BRI); 1.5 km ENE of Lamond Hill, 8.5 km NNW of Lockhart River community, Departmental and Official Purposes Reserve, Mar 1994, *Fell DGF4142 & Stanton* (BRI); NE side of Lamond Hill, Iron Range, Nov 1986, *Jessup 784* (BRI); 11.7 km NW of Lockhart River community, vacant Crown Land, Mar 1994, *Fell DGF4177 & Stanton* (BRI); Iron Range NP, CSIRO EP/42, *c.* 300 m SW of Claudie River crossing off Iron Range Road, Sep 2008, *Ford AF5428 et al.* (BRI); Iron Range, Jul 1963, *Volck 2585* (BRI); Hill E of Mt Tozer, Iron Range area, Nov 1977, *Tracey 14218* (BRI).

***Distribution and habitat*:** *Planchonella xylocarpa* occurs on Cape York Peninsula, north Queensland in the catchment of the Claudie River (**Map 17**), and in Papua New Guinea and Indonesian Papua in mesophyll and notophyll vineforest.

***Phenology*:** Flowers have been recorded in January and fruit July.

***Conservation status*:** *Planchonella xylocarpa* is listed as **Near Threatened** under the Queensland *Nature Conservation Act 1992*.

9. SERSALISIA

Sersalisia R.Br., *Prodr. Fl. Nov. Holland.* 529 (1810). **Type:** *S. sericea* (Sol. ex Aiton) R.Br.

Shrubs or trees, hermaphrodite. Leaves spirally arranged, entire; stipules absent. Tertiary and higher order venation areolate. Inflorescence axillary. Flowers fasciculate, 5-merous, sepals quincuncial, pubescent outside, pubescent or glabrous inside, persistent in fruit. Corolla tubular, the tube longer than the lobes. Stamens inserted just below the tube orifice, glabrous, included; anthers ovate, apiculate, basifixed. Staminodes inserted in the corolla sinus, narrowly triangular-ovate, flattened at apex, glabrous with a few hairs at apex. Gynoecium with a narrow style, the apex with round stigmatic areas. Fruit a berry, ellipsoid or ovoid; seeds 1–4; seed scar elliptical or very broad and 90–100% of seed length; testa thin and shining, brown; cotyledons plano-convex, radicle included, endosperm absent.

A genus of about seven species distributed from the Philippines to Australia including Borneo, Sulawesi and New Guinea with 4 species in Australia.

Key to the Australian species of *Sersalisia*

1 Corolla lobe margins ciliate; fruit reddish-brown setose with erect irritant trichomes until maturity . . . . **4. S. unmackiana**
1. Corolla lobe margins glabrous or with a few trichomes; fruit glabrous or soon nearly so **2**

2 Calyx lobes 3.2–4 mm long, glabrous on inside; fruit 2–2.5 cm long . . . . . . **1. S. sericea**
2. Calyx lobes more than 5 mm long, on inside sericeous or tomentose; fruit more than 2.5 cm long **3**

3 Calyx lobes 5–8 mm long; corolla 7–8 mm long, lobes shortly oblong to broadly obovate, truncate or emarginate, 1.9–2.3 mm long . . . . **2. S. sessiliflora**
3. Calyx lobes 8.5–10 mm long; corolla 9–11 mm long, lobes broadly ovate, 2.3–2.5 mm long . . . . **3. S. obpyriformis**

1. Sersalisia sericea (Sol. ex Aiton) R.Br., *Prodr. Fl. Nov. Holland.* 530 (1810); *Sideroxylon sericeum* Sol. ex Aiton, *Hort. Kew.* 1: 262 (1789); *Lucuma sericea* (Sol. ex Aiton) Benth. & Hook.f., *Gen. Pl.* 2: 654 (1876); *Pouteria sericea* (Sol. ex Aiton) Baehni, *Candollea* 9: 375 (1942). **Type:** [Australia. Cook District:] Bay of Inlets and Endeavour River, in 1770, *J. Banks & D. Solander s.n.* (syn: BM); Hort. Kew, in 1778, [collector unknown, probably W. Aiton] (syn: BM; isosyn: MEL).

Planchonella sericea Dubard, *Ann. Mus. Colon. Marseille* 20: 47 (1912). **Type:** Australia. Rockingham Bay, *J. Dallachy s.n.* (holo: P).

***Illustrations*:** Cooper & Cooper (2004: 512); Hyland *et al.* (2010).

Shrubs or trees to 10 m. Twigs felted. Leaves: petiole 2–7(–9) mm long; lamina ovate, suborbicular, obovate or elliptic, 2–7(–12) cm long, 1.5–4(–5.7) cm wide, apex obtuse to emarginate, persistently reddish brown or grey pubescent above and below; secondary veins 5–15 pairs; tertiary and higher order veins areolate. Pedicels 1.7–2.5(–3) mm long, tomentose. Calyx (4–)5-lobed, lobes ovate, 3.2–4 mm long, with appressed or felted trichomes on outside, glabrous on inside. Corolla 6.2–7.8 mm long, lobes suborbicular, 2–2.7 mm long, sericeous outside, shortly auriculate or sagittate at base, apical margin with a few trichomes. Stamens 1.5–1.7 mm long, anthers 1.2–1.3 mm long, filaments 0.3–0.5 mm long. Staminodes narrowly deltoid, *c.* 1.5 mm long, with a few trichomes near apex. Ovary conical, sericeous; style 4.5–5.5 mm long, sericeous near base. Fruit ellipsoid, 2–2.5 cm long, 1–1.5 cm wide, blue-black, glabrescent or glabrous, fleshy. Seed 1, ellipsoid, 16–19 mm long, 7–10 mm wide, 8–10 mm thick; hilum scar *c.* 4 mm wide; testa less than 0.5 mm thick. *Wild prune*, *mongo*.

***Additional selected specimens examined*:** **Western Australia.** Gupungi Road, Broome, May 1987, *Kenneally 9870* (BRI); Norman Creek, *c.* 10 km SW of Beagle Bay, Dampier Peninsula, Aug 2007, *Mitchell 8700* (BRI); Cape Leveque, Jul 1973, *Webb & Tracey 13144* (BRI); Cockatoo Island, Yampi Sound, Nov 1955, *Bateman s.n.* (BRI [AQ34690]); Near Crusher Pool, Mitchell Plateau, May 1981, *Webb & Tracey 15230* (BRI). **Northern Territory.** 2 km S of Fitzmaurice River narrows, May 1994, *Cowie 5009 & Albrecht* (BRI); Berry Springs Reserve, Nov 1978, *Rankin 1610* (BRI, CANB); Karslake Point, Melville Island, Jan 1966, *Stocker GS19* (BRI); Yirrkala, Aug 1948, *Specht 928* (BRI); Little Lagoon, Groote Eylandt, Apr 1948, *Specht 247* (BRI). **Queensland.** Burke District: Westmoreland, Lagoon Creek, off track to Camp Ridgeway, May 1997, *Forster PIF21007 & Booth* (BRI); Musselbrook Creek Gorge, 27.6 km by road NE of Musselbrook Mining Camp, 175 km N of Camooweal, Apr 1995, *Thomas MRS618 & Johnson* (BRI). Cook District: Ulu (Saddle Islet), 62 km NE of Horn Island Airfield, Torres Strait, Oct 2011, *Fell DGF10725* (BRI); Batavia Downs, 12.4 km from Peninsula Development Road on a seismic line running NE towards the Olive River, Oct 1989, *Neldner 2822 & Clarkson* (BRI); Coconut Creek, 7.5 km NNE of Beagle North Camp, *c.* 32 km S of Weipa, Dec 1981, *Clarkson 4185* (BRI); Cape Melville NP, Altanmoui Range Section, 1.6 km E of Flat Hill, 62.6 km NE of Lakefield Homestead, May 1993, *Fell DGF3195 & Stanton* (BRI); Morgans Folly, 38 km along road to Blackdown Station, off Chillagoe to Wrotham Park Road, Feb 1994, *Forster PIF14746* (BRI). North Kennedy District: Edmund Kennedy NP, near Cardwell, Dec 1991, *Bean 3883* (BRI); SSW of Townsville, Oct 1950, *Blake 18716* (BRI, CANB, L). South Kennedy District: R.60 Ossa, Cape Hillsborough, Hidden Valley, May 1975, *Hyland 8254* (BRI). Port Curtis District: Near One Mile Beach, Shoalwater Bay Training Area, N of Rockhampton, Apr 2011, *Bean 30993 & Halford* (BRI); Mt Maria, *c.* 65 km NW of Bundaberg, Nov 1993, *Bean 7001* (BRI).

***Distribution and habitat*:** *Sersalisia sericea* occurs from Broome, Western Australia, through northern parts of the Northern Territory across the Gulf of Carpentaria into Queensland where it is found from Torres Strait to just north of Bundaberg (**Map 22**). It occurs in semi-evergreen mesophyll vineforest, semideciduous notophyll vineforest, deciduous microphyll vinethicket, riparian forest, open forest and woodland on a wide range of soil types including laterite, coastal sands and limestone.

***Phenology*:** Flowers have been recorded from August to June and fruit from June to December.

***Typification*:** Hermann-Erlee & van Royen (1957), selected a Robert Brown specimen as a “lectotype” (neotype) overlooking the sheet in BM that has several specimens mounted on it including those collected by Banks and Solander and a specimen from Hort. Kew probably collected by Aiton. The Banks specimen from New South Wales is clearly mentioned by Aiton in contrast to Hermann-Erlee & van Royen’s (1957: 461) claim to the contrary, *viz.* “Sideroxylon sericeum 3. S. inerme, foliis ovatis subtus tomentoso-sericeis. Silky Iron-wood. Nat. of New South Wales. Sir Joseph Banks, Bart. [Baronet] Introd. 1772. Fl. Stove Shrubby”.

***Note*:** When Dubard published the name *Planchonella sericea* he did not cite the basionym *Sideroxylon sericeum* but a nomenclatural synonym (*Sersalisia sericea*), so in effect described a new species with a new type. His species was included as a synonym by Baehni (1942) under *Pouteria sericea* (Ait.) Baehni.

2. Sersalisia sessiliflora (C.T.White) Aubrév., *Adansonia* ser. 2,3: 333 (1964); *Lucuma sessiliflora* C.T.White, *Proc. Roy. Soc. Queensland* 47: 68 (20 May 1936). **Type:** Queensland. Cook District: Mount Demi, 6 February 1932, *L.J. Brass 2088* (holo: BRI; iso: A, G, MEL, MO, P).

Pouteria sylvatica Baehni, *Candollea* 9: 294 (1942), *non P. sessiliflora* (Sw.) Poir., *Encyc. Suppl.* 4. 546 (1816).

***Illustration*:** Hyland *et al.* (2010). Photo of flowers only.

Small trees to 12 m high. Twigs reddish to pale brown tomentose or felted. Leaves: petiole 10–15 mm long; lamina oblanceolate, obovate or elliptic, 4–10(–15) cm long, 2–5(–8.5) cm wide, apex bluntly acuminate or obtuse, reddish brown felted on both surfaces when young, becoming glabrous above and leaving a persistent closely appressed hyaline indumentum below; secondary veins 4–7 pairs, tertiary veins mostly oblique, the higher order veins areolate. Pedicels up to 1 mm long, reddish brown tomentose or felted. Calyx lobes 5, ovate, 5–8 mm long, on outside densely tomentose or felted, on inside lightly tomentose, margins fimbriate. Corolla 7–8 mm long, lobes shortly oblong to broadly obovate, truncate or emarginate at the apex, 1.9–2.3 mm long, apical margin glabrous. Stamens *c.* 1.5 mm long, anthers *c.* 1 mm long, filaments *c.* 0.5 mm long. Staminodes oblong or narrowly deltoid, *c.* 1.5 mm long, glabrous. Stamens *c.* 1.5 mm long, anthers *c.* 1 mm long, filaments *c.* 0.5 mm long. Staminodes oblong or narrowly deltoid, *c.* 1.5 mm long, glabrous. Ovary broadly ovoid, sericeous, *c.* 1.5 mm long; style narrowly conical), 7.5–8.5 mm long, sericeous, glabrous on distal one-third. Fruit (immature) oblong or narrowly obovoid, *c*. 3 cm long and 1.2 cm wide, glabrous or nearly so and bearing a thin style remnant 5 mm long. Seed not seen. **Figs. 8A–C, 9, 10.**

***Additional selected specimens examined*: Queensland.** Cook District: Mt Lewis road, S Mary LA, 16 km NNW of Mt Molloy, Nov 1988, *Jessup GJM1521 et al.* (BRI); Mt Lewis FR, 100 m NW of (sandy) Mary Creek crossing, Mt Lewis Road, Dec 2004, *Ford 4543 & Metcalfe* (BRI); Mt Lewis FR, *c.* 200 m NW of sandy Mary Creek crossing, near Julatten, Dec 2005, *Ford AF4777 & Cinelli* (BRI); Mt Lewis vascular plant survey 0.1 ha plot, Dec 2008, *Costion 1549* (BRI).

***Distribution and habitat*:** *Sersalisia sessiliflora* is endemic to the Wet Tropics of north-east Queensland and occurs at Mt Demi near Mossman and in the vicinity of Mt Lewis (**Map 23**), in simple notophyll vineforest and microphyll vine-fern forest and thicket on granitic soils mostly above 900m.

***Phenology*:** Flowers have been recorded in November and December and immature fruit in November.

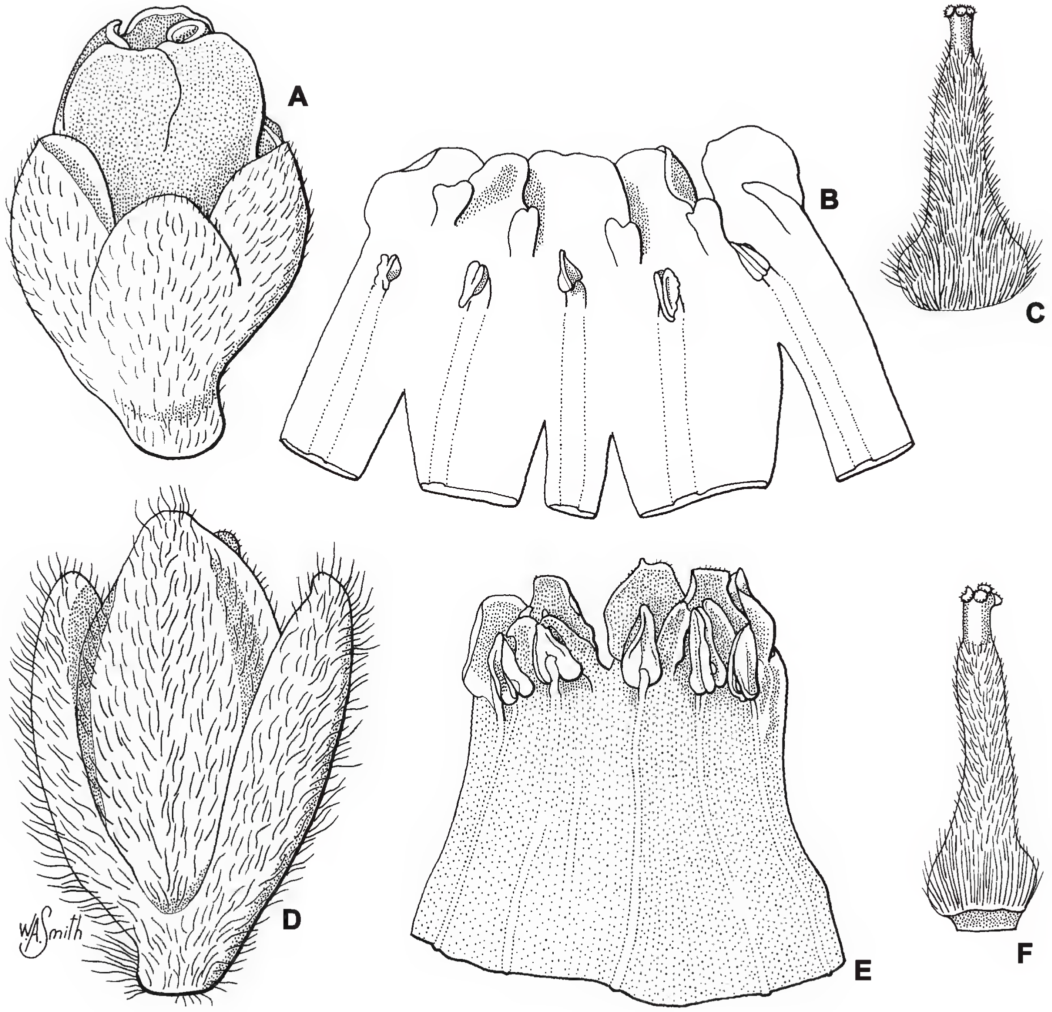

Fig. 8. A–C. ***Sersalisia sessiliflora***. A. flower ×6. B. dissected corolla ×6. C. dissected ovary and style ×6. A–C from *Ford AF4777 & Cinelli* (BRI); **D–F**. ***Sersalisia obpyriformis.*** D. flower ×6. E. dissected corolla ×6. F. dissected ovary and style ×6. D–F from *Hyland 25265RFK* (BRI).

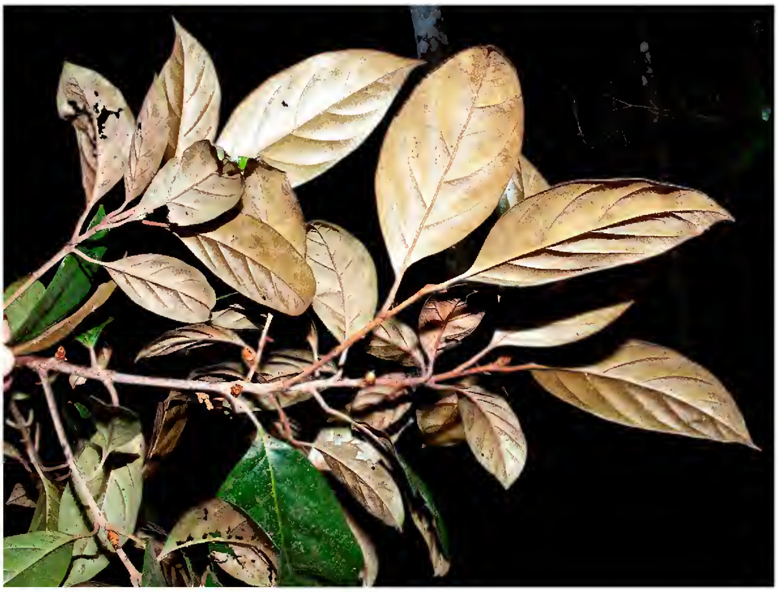

Fig. 9. ***Sersalisia sessiliflora***, branchlet viewed from below (no voucher). Photo: G. Sankowsky.

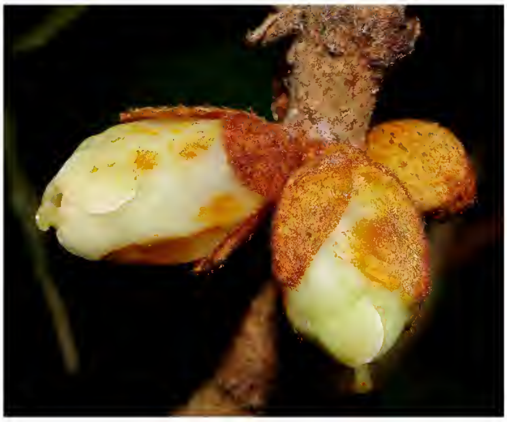

Fig. 10. ***Sersalisia sessiliflora*** flowers (no voucher). Photo: G. Sankowsky.

***Notes*:** The anthers seem small and underdeveloped in the flowers observed in both *Jessup GJM1521 et al.* and *Ford AF4777 & Cinelli* collections. Also a tree in cultivation which has produced flowers a number of times has never set fruit (G. Sankowsky *pers. comm.*). Further collections of flowering material are needed to determine if some or all flowers are functionally one sex.

3. Sersalisia obpyriformis (F.M.Bailey) Jessup **comb. nov.**; *Lucuma obpyriformis* F.M. Bailey, *Queensland Agric. J.* 15: 492 (1904); *Pouteria obpyriformis* (F.M.Bailey) Baehni, *Candollea* 9: 412 (1942). **Type:** Queensland. Cook District: “Meston’s Bellenden-Ker Expedition, 1904” (holo: BRI† [material lost or destroyed]); State Forest Reserve 755 Palmerston, Brewer Logging Area, Dec 1987, *B.P. Hyland 25266RFK* (neo: BRI [here selected]).

Pouteria sp. (Barong M. Tucker 22); Jessup (1994, 1997, 2002).

***Illustration*:** Hyland *et al.* (2010). Photos of fruit and seedlings only.

Small trees to 10 m high. Twigs reddish to pale brown tomentose or felted. Leaves: petiole 8–15 mm long; lamina oblanceolate, obovate or elliptic, 4–10(–20) cm long, 2–5(–8.5) cm wide, apex bluntly acuminate or obtuse, reddish brown felted on both surfaces when young, becoming glabrous above and leaving a persistent closely appressed hyaline indumentum below; secondary veins 7(–11) pairs, tertiary veins mostly oblique, the higher order veins areolate. Pedicels up to 1 mm long, reddish brown tomentose or felted. Calyx lobes 5, oblong or narrowly ovate, 8.5–10 mm long, on outside densely tomentose or felted, on inside sericeous, margins fimbriate. Corolla 9–11 mm long, lobes broadly ovate, 2.3–2.5 mm long, apical margin glabrous or with a few minute trichomes. Stamens *c.* 2 mm long, anthers *c.* 1.5 mm long, filaments 0.3–0.5mm long. Staminodes oblong or narrowly deltoid, 2–2.5 mm long, glabrous. Ovary broadly ovoid, sericeous, *c.* 1.5 mm long; style narrowly conical, 7.5–8.5 mm long, sericeous, glabrous on distal one-third. Fruit narrowly obpyriform, fleshy, 5–9 cm long, 2.5–4 cm wide, dark purple, glabrous or nearly so. Seed 1, ellipsoid, 30–45 mm long, 9–12 mm wide, 10–13 mm thick, hilum scar *c.* 8 mm wide; testa less than 1 mm thick, brown. **Fig. 8D–F, 11–13.**

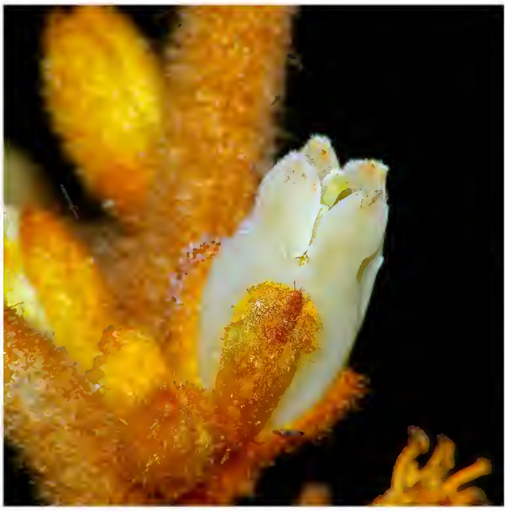

Fig. 11. ***Sersalisia obpyriformis*** flowers (*Tucker 22*, BRI). Photo: G. Sankowsky.

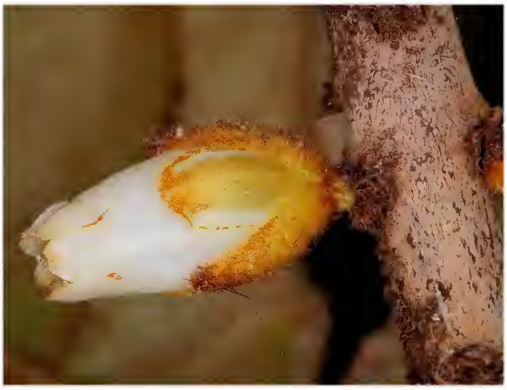

Fig. 12. ***Sersalisia obpyriformis*** flowers (*Tucker 22*, BRI). Photo: G. Sankowsky.

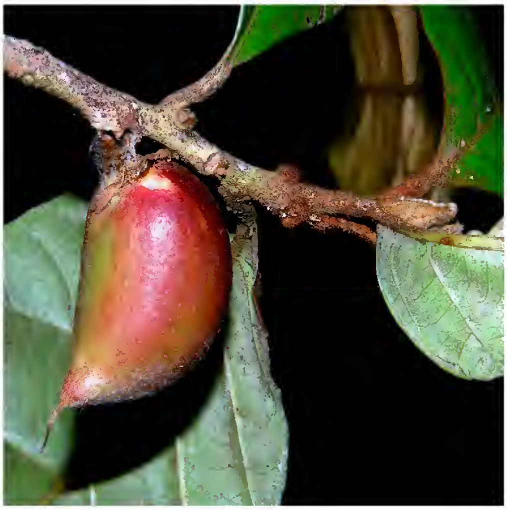

Fig. 13. ***Sersalisia obpyriformis*** fruit (*Tucker 22*, BRI). Photo: G. Sankowsky.

***Additional selected specimens examined*:** **Queensland.** Cook District: SFR 755, Barong LA, Oct 1976, *Hyland 9163* (BRI); *ibid*, Jan 1977, *Hyland 9293* (BRI); *ibid*, Jan 1977, *Hyland 9296* (BRI); *ibid*, Jul 1975, *Hyland 3240RFK* (BRI); *ibid*, Jul 1975, *Hyland 3243RFK* (BRI); *ibid*, Feb 1979, *Stocker 1722* (BRI); SFR 755 Palmerston, Brewer LA, Dec 1987, *Hyland 25265RFK* (BRI); *ibid*, Dec 1987, *Hyland 25266RFK* (BRI); Top bank of Johnstone River (north) off Walton Road, W of Innisfail, Aug 2005, *Ford 4676* (BRI); Junction of Alexandra Creek and Russell River, Sep 1996, *Jensen 803* (BRI); Alexandra Creek, Russell River Valley, Sep 1996, *Jago*

4087 et al. (BRI); Edge of Russell River (*c.* 20 km in off highway from Russell River crossing), Dec 1985, *Tucker 22* (BRI); Barong via Woopen Creek, Dec 2006, *Jensen 1558* (BRI).

***Distribution and habitat*:** *Sersalisia obpyriformis* is endemic to the Wet Tropics bioregion of north-east Queensland and occurs in and around Wooroonooran NP (**Map 23**), in mesophyll vineforest, mostly below 200 m.

***Phenology*:** Flowers have been recorded from August to January and fruit in December and February.

***Typification*:** Only fruit were collected and later used by Bailey to describe the species and these have since been lost, hence the need to select a neotype.

4. Sersalisia unmackiana (F.M.Bailey) Domin, *Biblioth. Bot.* 89: 508 (1928); *Lucuma unmackiana* F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 4: 12 (1891); *Pouteria unmackiana* (F.M.Bailey) Erlee, *Blumea* 8: 470 (1957); *Bureavella unmackiana* (F.M.Bailey) Aubrév. (as '*unmarkiana*'), *Adansonia* ser. 2, 3: 332 (1964); *Richardella unmackiana* (F.M.Bailey) Baehni, *Boissiera* 11: 99 (1965). **Type:** Queensland. Cook District: Musgrave E.T. Station, Cape York Peninsula, in 1891, *G. Jacobson s.n.* (holo: BRI [AQ226606]; iso K, MEL).

***Illustrations*:** Cooper & Cooper (2004: 512); Hyland *et al.* (2010).

Trees to 10 m high. Twigs pale reddish brown tomentose or felted. Leaves: petiole 3–5 mm long; lamina broadly ovate, obovate or oblanceolate, 2–7.5 cm long, 1.2–5.5 cm wide, apex obtuse or sometimes apiculate, persistently persistent above and below; secondary veins 4–8 pairs; tertiary veins oblique, the higher order veins areolate. Pedicels *c.* 1 mm long. Outer calyx lobes broadly ovate, acute, 6–8 mm long, inner ones ovate, acuminate, 9–12 mm long, both tomentose outside, sericeous inside on upper half. Corolla 11.2–11.5 mm long, lobes broadly ovate, 4.2–4.5 mm long, upper margins ciliate. Stamens 3.5–3.7 mm long, filaments *c.* 2.5 mm long, anthers 1.8–2 mm long. Staminodes oblong-deltoid, 2.5–2.7 mm long, with sparse or moderately dense trichomes towards apex. Ovary ovoid to subglobose, sericeous; style terete, 8.8–9 mm long, glabrous. Fruit subglobose, broadly obovoid or oblate, subligneous, 4–7 cm long, 3–6 cm wide, red and with a dense covering of *c.* 3 mm long reddish-brown setaceous trichomes. Seeds 1–2(–3), globose, to 45 mm long, to 40 mm wide; scar covering 75% of seed; testa 1.5–3 mm thick.

***Additional selected specimens examined*:** **Queensland.** Cook District: Long Beach, Prince of Wales Island, Torres Strait, Oct 2005, *Waterhouse BMW7324* (BRI); Track to rubbish dump at QPWS Heathlands Ranger Base, Cape York Peninsula, Jun 2008, *Forster PIF34063 & McDonald* (BRI); Maloney's Springs, 40 km E by road of Moreton Telegraph Station, Jun 1989, *Forster PIF5464 & Tucker* (BRI); Bromley Station – Pascoe River, Sep 1976, *Hyland 9015* (BRI, CANB, CNS, K, L); Rocky Point, near Weipa, Jan 1989, *O'Reilly 100* (BRI); 11.25 km N of Weipa Mission, Jul 1974, *Specht W546 & Salt* (BRI); Amban (False Pera Head), Aug 1999, *Smith NMS4420* (BRI); Mungkan Kandju NP (on Peninsula Development Road), NW of Coen, Jul 2001, *Cooper WWC1561 & Cooper* (BRI); 113 km W of Merapah on the blazed track to Peret, *c.* 30 km S of Aurukun, Oct 1982, *Clarkson 4556* (BRI); Head of Pinnacle Creek – Coen River, on boundary of Crystal Vale Station and Rokeby NP, 26 km WSW of Coen, Aug 1990, *Fell DF2171* (BRI); Hann River, Jun 1997, *Hyland 25950RFK* (BRI); Baas Outstation, *c.* 35 km S of Pormpuraaw, Oct 2008, *McDonald KRM8054 & Winter* (BRI); 'New Laura', Calders Yard, Lakefied NP, Oct 1985, *Williams 85271* (BRI); 134 km by road N of Coen PO on Kennedy Road towards Pascoe River, Sep 1975, *Coveny 7083 & Hind* (BRI); E bank of Wenlock River, Portland Roads Road, Sep 2003, *Waterhouse BMW6748* (BRI); 0.6 km from Holroyd River crossing on Holroyd to Southwell Road, Jul 1993, *Clarkson 10127 & Neldner* (BRI); Morehead River, Sep 1971, *Irvine 55* (BRI, K, L); Melsonby NP, N of Battle Camp Road, NW of Cooktown, May 2010, *Forster PIF36823 & Thomas* (BRI); 7 miles [11.3 km] NW of Laura, W of Little Laura River, Oct 1962, *Smith 11688* (BRI, CANB, K, L); 8 km SE of Laura on road to Quinkan art site, Jul 1990, *Bean 1820* (BRI).

***Distribution and habitat*:** *Sersalisia unmackiana* is endemic to Cape York Peninsula in far north Queensland and occurs from Torres Strait to south of Laura on the eastern side and to north of Karumba on the western side (**Map 24**). It occurs mostly in *Eucalyptus* and *Corymbia* open woodland but also in littoral forest, semideciduous notophyll vineforest and deciduous vinethickets.

***Phenology*:** Flowers have been recorded in January, May, July and August and fruit from June to January.

10. DONELLA

Donella Pierre ex Baillon, *Hist. Pl.* 11: 294 (1891). **Type:** *D. roxburghii* (G.Don) Pierre ex Lecomte, *Fl. Indo-Chine [P.H. Lecomte et al.]* 3: 897 (1930).

Trees. Leaves distichous. Stipules absent. Lamina venation brochidodromous with a submarginal vein and intersecondary and tertiary veins frequently parallel to the close secondary veins and scarcely distinguishable from them, the leaf appearing finely striate. Flowers bisexual or unisexual. Calyx a single whorl of 5 sepals. Corolla lobes 5. Stamens 5, attached to the lower half of the corolla tube, included; anthers often bearing an apical tuft of hairs. Staminodes absent. Disk absent. Ovary 5-locular, style included, stigmatic lobes small but distinct. Fruit ellipsoid to subglobose, with up to 5 seeds. Seed ellipsoid, laterally compressed, with an adaxial scar; testa smooth and shining; cotyledons thin, foliaceous, endosperm abundant.

A genus of about 10 species from Africa and India through south-east Asia to Australia, 1 species in Australia.

Donella lanceolata (Blume) Aubrév., *Fl. Cambodge, Laos & Vietnam* 3: 64 (1963); *Nycterisition lanceolatum* Blume, *Bijdr. Fl. Ned. Ind.* 12: 676 (1826); *Chrysophyllum lanceolatum* (Blume) DC., *Prodr. [A. P. de Candolle]* 8: 162 (1844), *nom. illegit. non* Casaretto (1843). **Type:** Java, *s.dat.*, *Blume 775* (lecto: L, *fide* Vink 1958: 29).

Chrysophyllum roxburghii G.Don, *Gen. Hist.* 4: 33 (1838); *Donella roxburghii* (G.Don) Pierre ex Lecomte, *Fl. Indo-Chine [P.H.Lecomte et al.]* 3: 897 (1930); *C. acuminatum* Roxb., *Fl. Indica* 2: 345 (1824), *nom. illegit. non* Lamarck (1794). **Type:** Silhet, *s.dat.*, *F. de Silva s.n.* (syn: K [Wallich herb. 4160A]).

***Illustrations*:** Aubréville (1963: Pl. XI); Cooper & Cooper (2004: 505); Hyland *et al.* (2010) [latter two both as *Chrysophyllum roxburghii*].

Trees to 55 m. Twigs with reddish-brown felted trichomes fading to white, glabrescent. Leaves with petiole 3–7.5 mm long, tomentose; lamina lanceolate or elliptic, 4–11 cm long, 1.7–3.5 cm wide, apex acuminate, base shortly attenuate or cuneate, glabrescent above and below; secondary veins 12–40 pairs. Flowers fasciculate; pedicels 3–6 mm long, reddish brown sericeous or felted; calyx lobes ovate or suborbicular, 1.2–1.5 mm long, glabrescent outside, glabrous inside, margin entire or ciliate. Corolla tube 0.9–1.2 mm long, lobes linguiform or trapeziform, 1–1.5 mm long, apex truncate or obtuse, margins ciliate. Stamens attached near the base of corolla tube, 1.3–1.5 mm long. Ovary ovoid, pilose; style narrowly conical, *c.* 1 mm long, glabrous; stigmatic lobes small but discrete. Fruit globose or broadly ovoid, fleshy, 4–6 cm long, 4–6 cm wide, pale brown to yellow. Seeds 1–5, oblong-obovoid, compressed, 20–25 mm long, 10–12 mm wide, testa brown.

***Additional selected specimens examined*:** **Queensland.** Cook District: Banks Peak, Moa Island, Torres Strait, Jul 2008, *Fell DGF9738 & Stanton* (BRI); Iron Range NP, S side of Pascoe River, Sep 2004, *Sankowsky 2509 & Sankowsky* (BRI); Iron Range, Jun 1948, *Brass 19111* (BRI, K, L); *ibid*, Sep 1962, *Volck 2404* (BRI);); *ibid*, Jul 1963, *Volck 2586* (BRI); Claudie River between Portland Roads and Iron Range, Oct 1968, *Webb & Tracey 8527* (BRI); West Claudie River, Jul 1972, *Hyland 6211* (BRI); Claudie River, Oct 1972, *Hyland 6397* (BRI); *ibid*, Jan 1973, *Hyland 6645* (BRI); *ibid*, Jan 1973, *Hyland 6654* (BRI, K, L); *ibid*, Jan 1982, *Hyland 11532* (CNS); *ibid*, Oct 1982, *Hyland 25092RFK* (BRI); McIlwraith Range, NE of Coen, in 1962, *Webb & Tracey 7326* (BRI); Leo Creek and Nesbit River confluence, Silver Plains, Jul 1997, *Forster PIF21309 et al.* (BRI); TR 14, McIlwraith Range – Leo Creek, Sep 1975, *Hyland 8452* (BRI); Rocky River on E foothills of McIlwraith Range, Oct 1969, *Webb & Tracey 9377* (BRI); Rocky River, Sep 1971, *Hyland 5443* (BRI, L); *ibid*, Sep 1973, *Hyland 2832RFK* (BRI); 4 km W of Isabella Falls on Battle Camp road, Nov 1989, *Jessup GJD3027 et al.* (BRI).

***Distribution and habitat*:** *Donella lanceolata* occurs in south-east Asia and Malesia to the Solomon Islands and in Australia in north-east Queensland from Torres Strait to Cooktown (**Map 24**) in mesophyll and notophyll vineforest.

***Phenology*:** Flowers have been recorded in June, July and October and fruit in September.

***Conservation status*:** *Donella lanceolata* is listed as **Near Threatened** under the Queensland *Nature Conservation Act 1992*.

11. CHRYSOPHYLLUM

Chrysophyllum L., *Sp. Pl.* 192 (1753). **Type:** *C. cainito* L.

Small to medium-sized trees. Stipules absent. Leaves usually distichous. Venation brochidodromous with intersecondary and tertiary veins frequently parallel to the secondary veins. Inflorescence mostly axillary. Flowers bisexual. Calyx a single whorl of (4–)5(–6) imbricate or quincuncial sepals. Corolla lobes (4–)5(–8). Stamens (4–)5(–8), attached at the top of the corolla tube, included; anthers extrorse in bud. Staminodes absent. Disk absent. Ovary (4–)5(–12)-locular, style included, stigmatic lobes distinct. Fruit a 1–many-seeded berry. Seed ellipsoid, usually not laterally compressed, with an adaxial scar; testa usually smooth and shining. Cotyledons thin, foliaceous, or (not in Australia) thick, endosperm abundant.

The genus is represented by 15–20 species in the New World Tropics (Cronquist 1945) but a few species are widely cultivated and often naturalised (Peterson *et al.* 2012).

Key to the species of *Chrysophyllum* in Australia

1 Pedicels 9–12 mm long; stigma lobes mostly 7–12; fruit globular, several-seeded, 7 cm or more diameter; foliage trichomes mostly 0.2–0.5 mm long . . . . **1. C. cainito**

1. Pedicels 4–7 mm. long; stigma lobes mostly 5; fruit mostly ellipsoid, 1-seeded, up to 2 cm long and 1 cm wide; foliage trichomes mostly 0.5–1 mm long . . . . **2. C. oliviforme**

1. Chrysophyllum cainito L. *Sp. Pl.* 192 (1753). **Type:** Icon in Sloane, *Voy. Jamaica* 2: 170, t. 229 (1725) (lecto: *fide* Howard 1989: 57).

Trees to 6 m or more. Twigs densely felted-sericeous. Leaves with petiole 10–17 mm long; lamina elliptic or oblong, 6–15 cm long, 2.5–8 cm wide, apex shortly acuminate, base obtuse or acute, glabrescent above, densely rufous-sericeous beneath; secondary veins 12–20. Flowers numerous in axillary clusters, pedicels 9–12 mm long, felted-sericeous; calyx lobes suborbicular 1–1.2 mm long, felted outside, glabrous inside; corolla tube *c.* 1.5 mm long, appressed pubescent distally on outside, lobes ovate, *c.* 2 mm long, with appressed trichomes outside except on margins. Staminal filaments *c.* 0.5 mm long, anthers *c.* 0.7 mm. long. Ovary ovoid, appressed pubescent; style 0.3–0.4 mm long, glabrous; stigma discoid, 7–12-lobed. Fruit globular, 7 cm or more diameter, dark purple. Seeds several, flattened and obliquely obovate, with a broad scar nearly the length of the seed. *Star-apple*, *cainito*.

***Additional specimens examined*:** **Queensland.** Cook District: Barron Gorge NP, Stoney Creek section, Sep 2008, *McKenna SGM302* (BRI); Clump Mountain NP, off Boyett Road, North Mission Beach, Jan 2009, *Ford AF5457 & Lawson* (BRI).

***Distribution and habitat*:** *Chrysophyllum cainito* is reported to be native to the West Indies but is widely cultivated in the tropics and subtropics. It is sometimes encountered as a garden remnant but has also been noted to be naturalised at two localities in the Wet Tropics of north-east Queensland (**Map 25**).

***Phenology*:** Flowers have been recorded in February and May. No fruiting specimen records were available for Australia.

2. Chrysophyllum oliviforme L., *Syst.* ed. 10. 2: 937 (1759). **Type:** Icon "*Chrysophyllum*" in Plumier in Burman, *Pl. Amer.* 57, t. 69 (1756) (lecto: *fide* Vink 1958: 28).

Trees to 10 m. Twigs densely felted-sericeous. Leaves with petiole 8–14 mm long; lamina elliptic or oblong, 4–9 cm long, 2–5.5 cm wide, apex shortly acuminate, base obtuse or acute, glabrescent above, densely rufous-sericeous beneath; secondary veins 12–20. Flowers numerous or few in the axillary clusters, pedicels 4–7 mm long, felted. Calyx lobes broadly ovate or suborbicular, 1.5–1.7 mm long, felted-sericeous outside, glabrous inside. Corolla tube *c.* 2.5 mm long, appressed pubescent outside, glabrous inside, lobes broadly ovate, *c.* 1.5 mm long, appressed pubescent only at the base outside. Staminal filaments *c.* 1 mm long; anthers 0.6–0.8 mm long. Ovary ovoid, appressed pubescent; style 0.5–0.6 mm long, glabrous; stigma discoid, 5-lobed. Fruit ellipsoid, to 2 cm long, *c.* 1 cm wide, dark purple. Seeds single, flattened and with a broad basilateral scar. *Satin leaf.*

***Additional selected specimens examined*: Queensland.** Moreton District: Holly Conservation Area – off Caroline Cres., Buderim, Oct 2017, *Flenady BF17-BHCA1* (BRI); Along Enoggera Creek, The Gap, Brisbane, Feb 2007, *Navie & Morton s.n.* (BRI [AQ617814]); Council reserve adjacent to Thornycroft St., Tarragindi, 7 km S of Brisbane CBD, Oct 2009, *Bean 29240* (BRI).

***Distribution and habitat*:** *Chrysophyllum oliviforme* is native to southern Florida, the Bahama Islands, and the Greater Antilles and is widely cultivated as an ornamental. It is recorded as naturalised in southeast Queensland (**Map 25**).

***Phenology*:** Flowers have been recorded in October, February, March and May and fruit in October.

Excluded name

Sideroxylon argenteum Thunb., *Prodr. Pl. Cap.* 36 (1794). **Type:** (not cited).

Sprengel (1824: 666) incorrectly placed *Sideroxylon obovatum* R.Br. (= *Planchonella obovata* (R.Br.) Pierre) from New Holland as a synonym of *S. argenteum* Thunb. (= *Heeria argentea* (Thunb.) Meisn., (Anacardiaceae); see Palmer & Pitman 1972: 1207).

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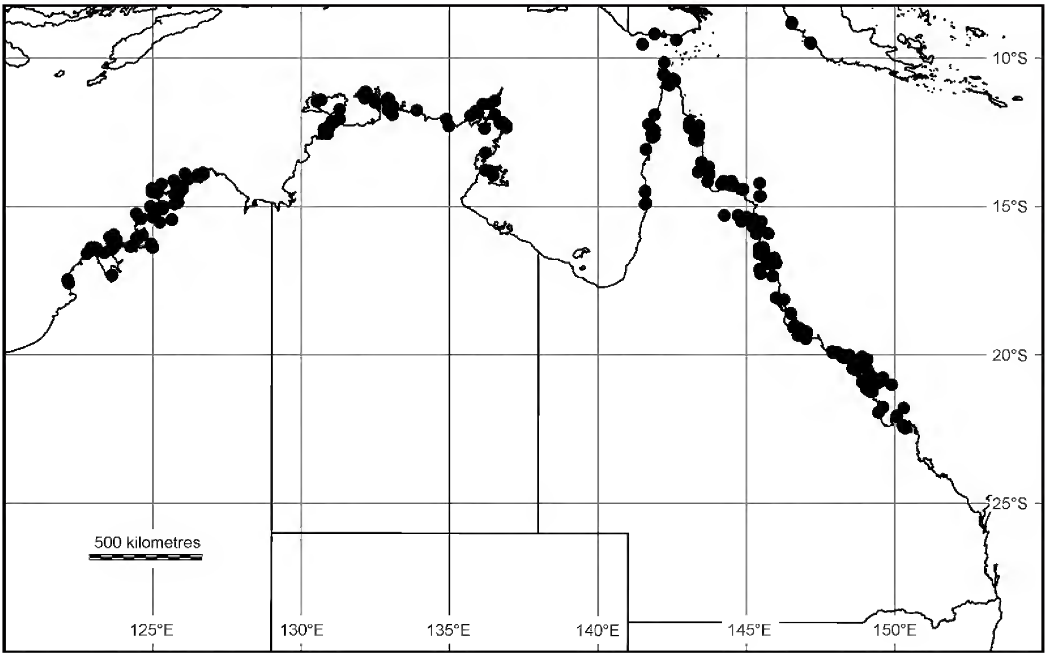
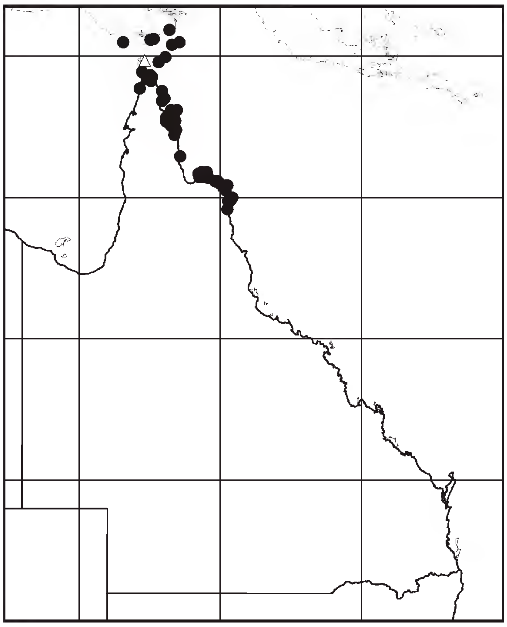
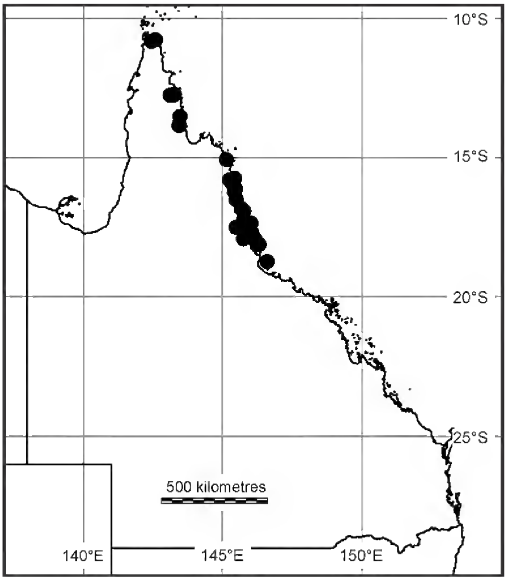


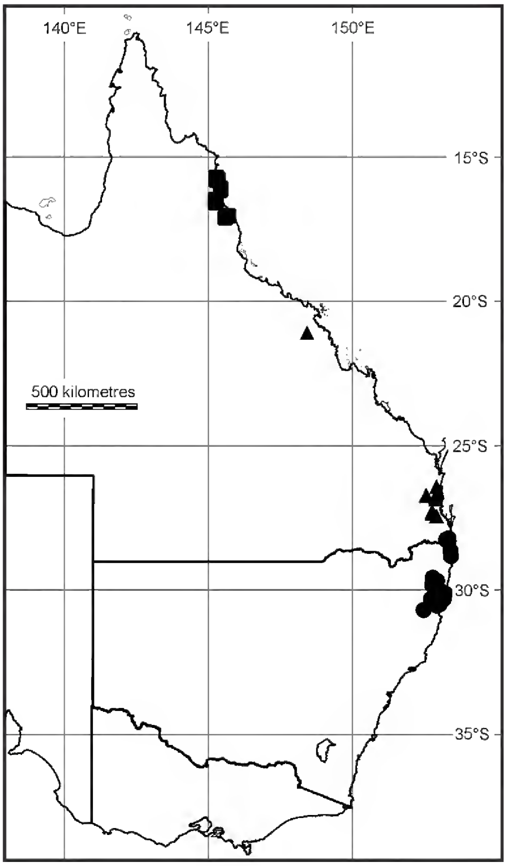
Map 1. Distribution of ***Mimusops elengi*** in Australia.



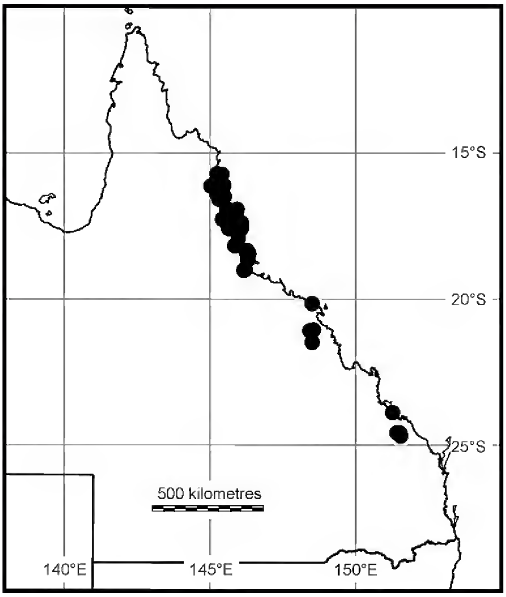
Map 2. Distribution of ***Manilkara kauki*** ● and ***M. kanosiensis*** △ in Australia.


10°S
15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

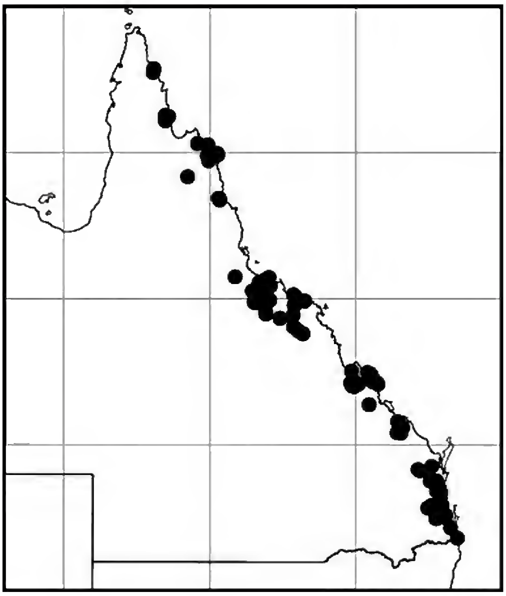
Map 3. Distribution of ***Palaquium galactoxylon*** in Australia.


140°E
145°E
150°E
15°S
20°S
25°S
30°S
35°S
500 kilometres

Map 4. Distribution of ***Niemeyera chartacea*** ▲, ***N. discolor*** ■ and ***N. whitei*** ●.

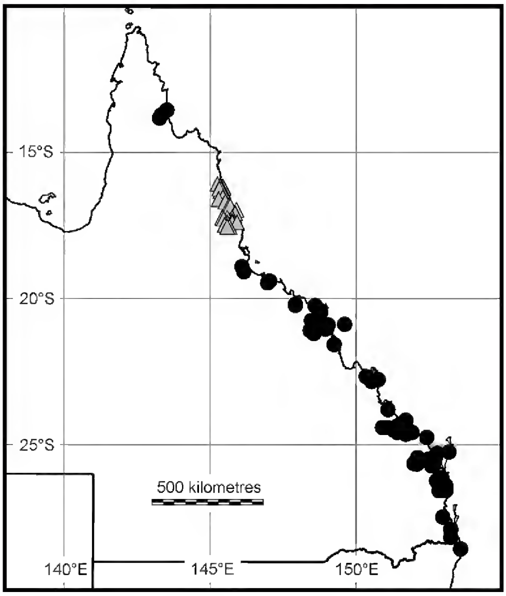

15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

Map 5. Distribution of ***Niemeyera prunifera***.

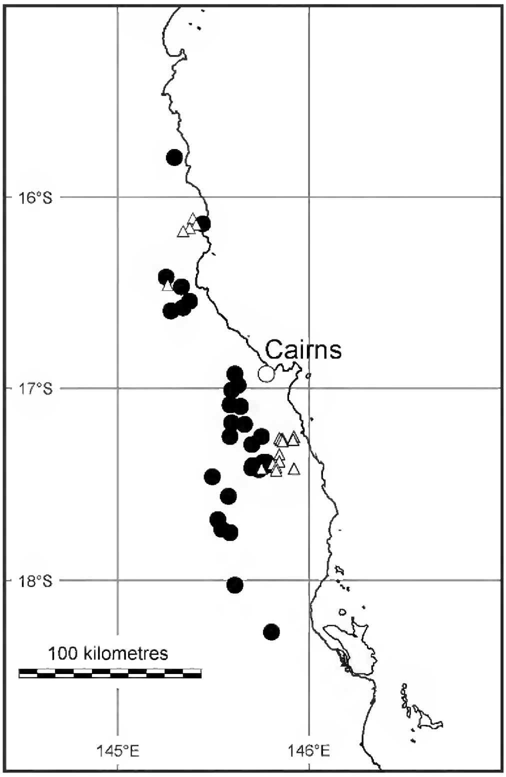


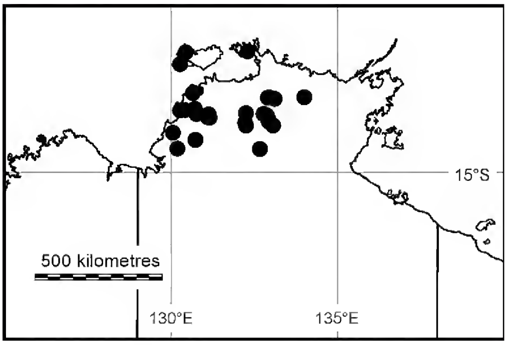
Map 6. Distribution of ***Amorphospermum antilogum*** in Australia.

Map 8. Distribution of ***Pleioluma brownlessiana*** ● and ***P. singuliflora*** △. ➔

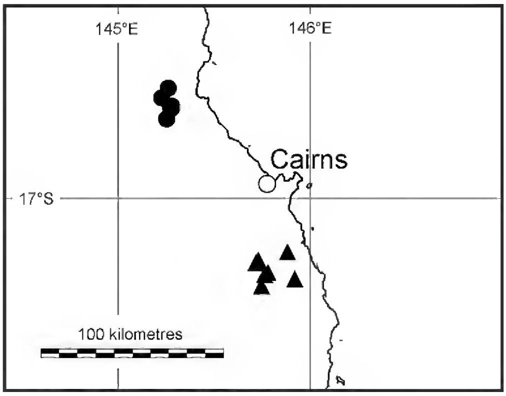

15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

Map 7. Distribution of ***Pleioluma queenslandica*** ● and ***Van-royena castanosperma*** ▲, the latter only for the Australian occurrence.

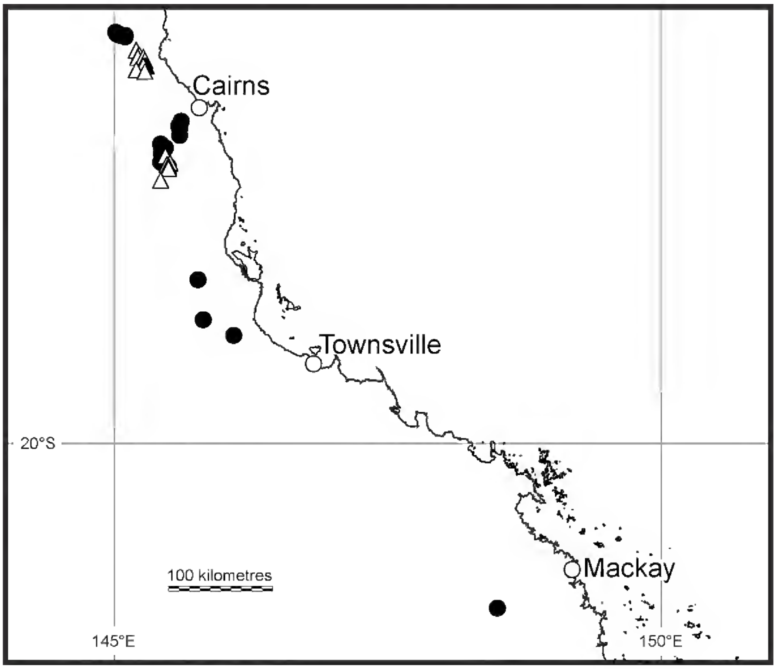

16°S
Cairns
17°S
18°S
100 kilometres
145°E
146°E


15°S
500 kilometres
130°E
135°E

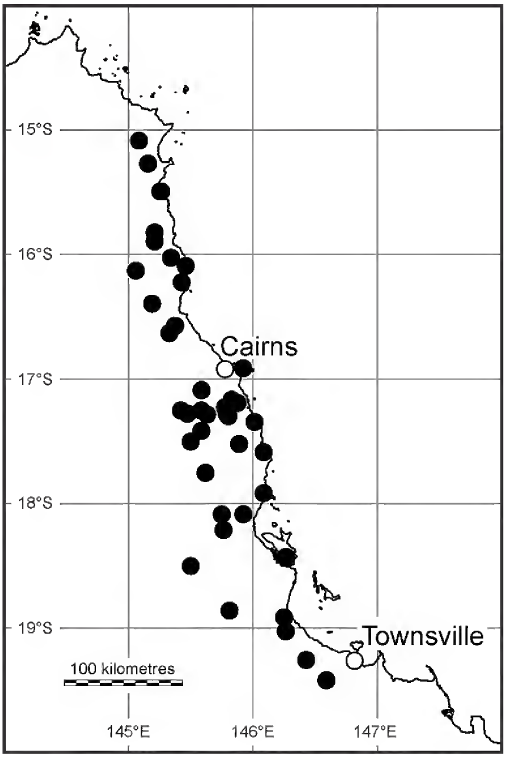
Map 9. Distribution of ***Pleioluma laurifolia*** in Australia.


145°E
146°E
Cairns
17°S
100 kilometres

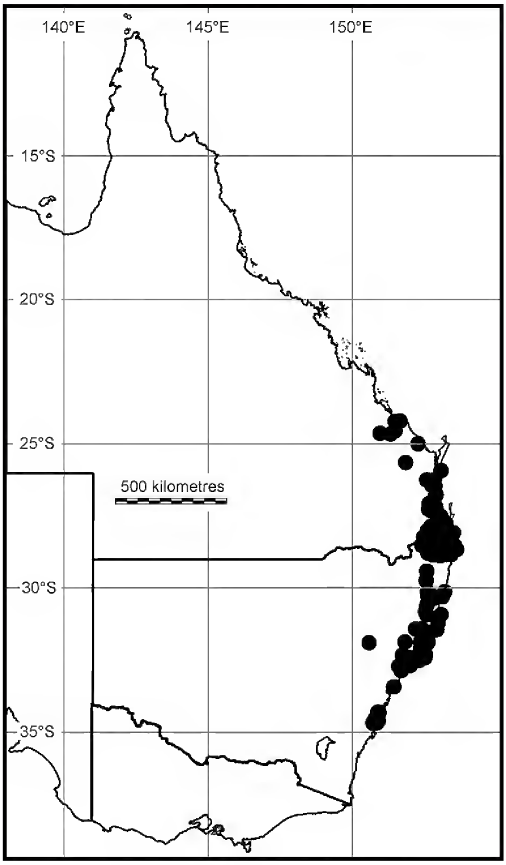
Map 11. Distribution of ***Pleioluma ferruginea*** ● and ***P. pilosa*** ▲.


Cairns
Townsville
20°S
100 kilometres
Mackay
145°E
150°E

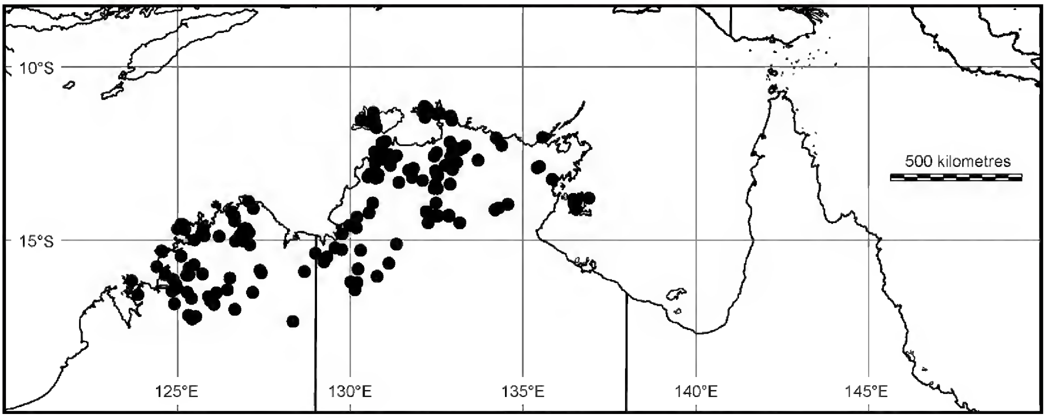
Map 10. Distribution of ***Pleioluma macrocarpa*** ● and ***P. papyracea*** △.


15°S
16°S
17°S
18°S
19°S
Cairns
Townsville
100 kilometres
145°E
146°E
147°E

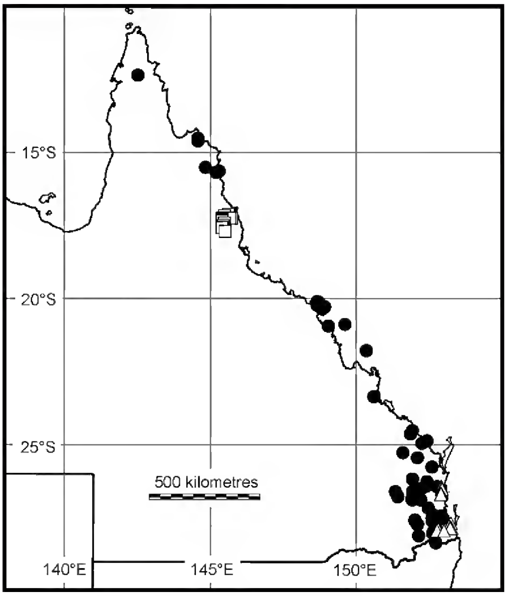
Map 12. Distribution of ***Pleioluma xerocarpa***.


140°E
145°E
150°E
15°S
20°S
25°S
30°S
35°S
500 kilometres

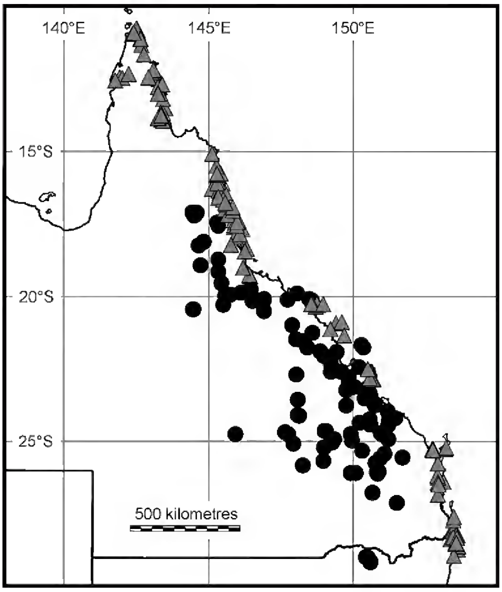
Map 14. Distribution of ***Planchonella australis***.


10°S
15°S
500 kilometres
125°E
130°E
135°E
140°E
145°E

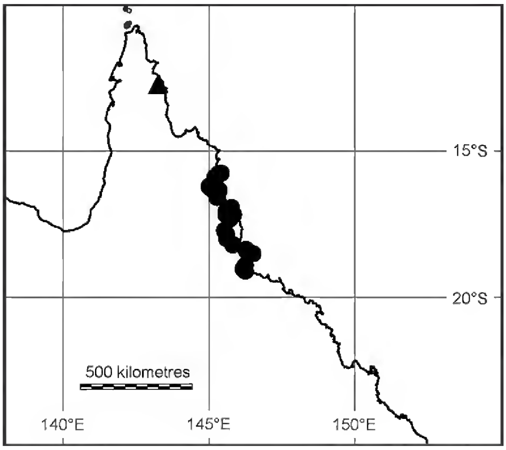
Map 13. Distribution of ***Planchonella arnhemica***.


15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

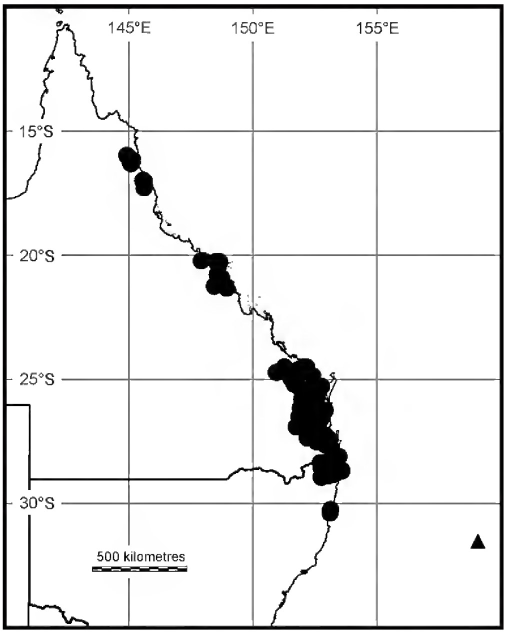
Map 15. Distribution of ***Planchonella asterocarpon*** □, ***P. cotinifolia*** var. ***cotinifolia*** ● and ***P. eerwah*** △.


140°E
145°E
150°E
15°S
20°S
25°S
500 kilometres

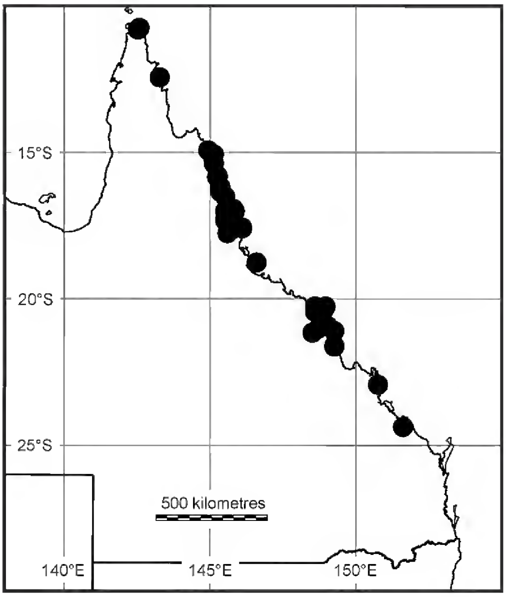
Map 16. Distribution of ***Planchonella chartacea*** ▲ and ***P. cotinifolia*** var. ***pubescens*** ●.


15°S
20°S
500 kilometres
140°E
145°E
150°E

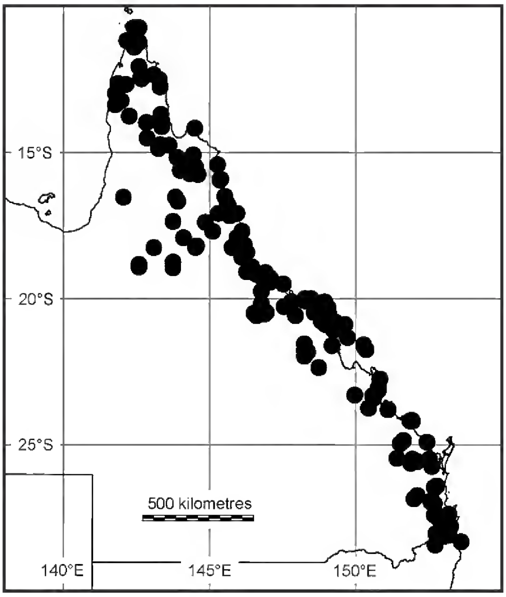
Map 17. Distribution of ***Planchonella euphlebia*** ● and ***P. xylocarpa*** ▲, the latter only for the Australian occurrence.


145°E
150°E
155°E
15°S
20°S
25°S
30°S
500 kilometres

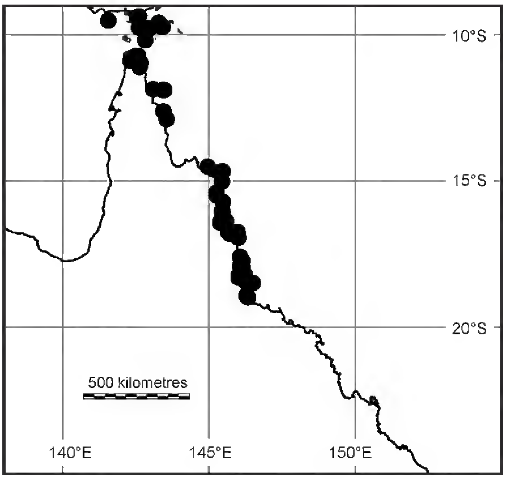
Map 18. Distribution of ***Planchonella myrsinifolia*** subsp. ***myrsinifolia*** ● and ***P. myrsinifolia*** subsp. ***howeana*** ▲.


15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

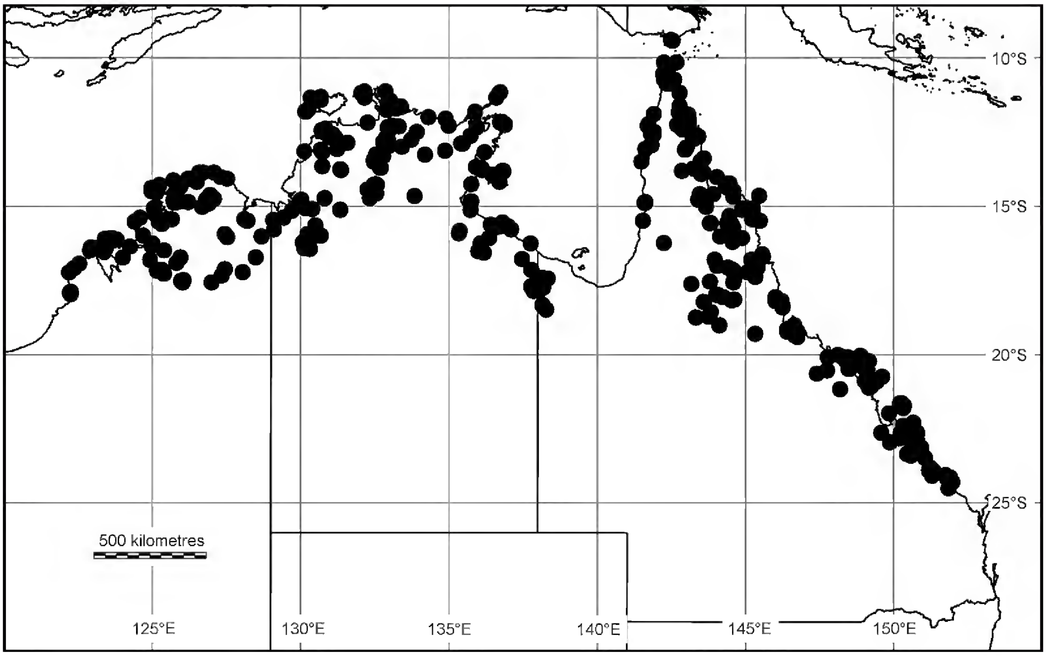
Map 19. Distribution of ***Planchonella myrsinodendron*** in Australia.


15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

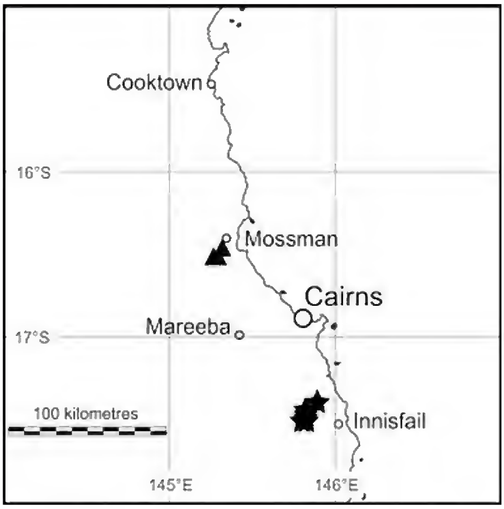
Map 21. Distribution of ***Planchonella pohlmaniana***.


10°S
15°S
20°S
500 kilometres
140°E
145°E
150°E

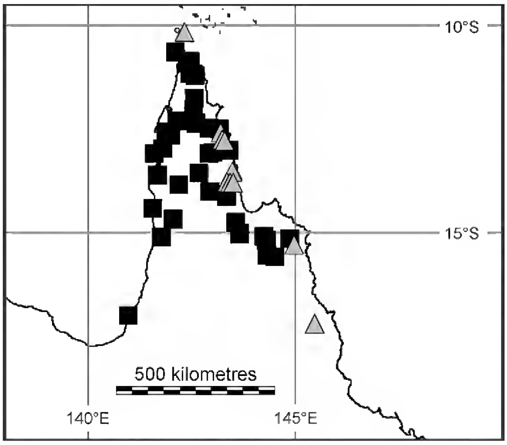
Map 20. Distribution of ***Planchonella obovata*** in Australia.


10°S
15°S
20°S
25°S
500 kilometres
125°E
130°E
135°E
140°E
145°E
150°E

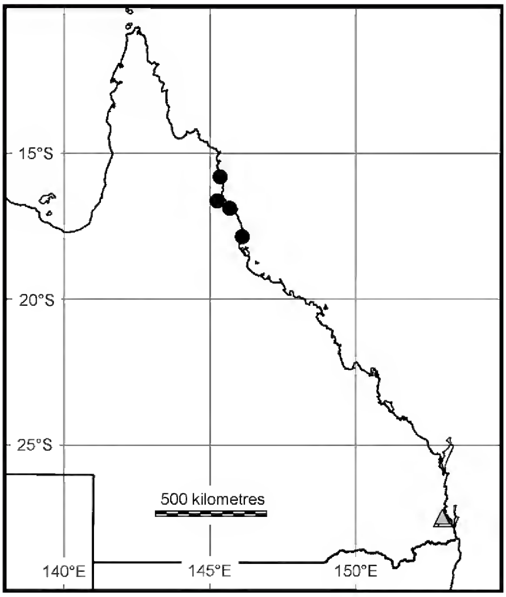
Map 22. Distribution of ***Sersalisia sericea***.


Cooktown
16°S
Mossman
Cairns
Mareeba
17°S
100 kilometres
Innisfail
145°E
146°E

Map 23. Distribution of ***Sersalisia obpyriformis*** ★ and ***S. sessiliflora*** ▲.


10°S
15°S
500 kilometres
140°E
145°E

Map 24. Distribution of ***Sersalisia unmackiana*** ■ and ***Donella lanceolata*** △ the latter only for the Australian occurrence.


15°S
20°S
25°S
500 kilometres
140°E
145°E
150°E

Map 25. Distribution of naturalised populations of ***Chrysophyllum cainito*** ● and ***C. oliviforme*** ▲ in Australia.

Charles James Wild (1853–1923), an ardent collector of Queensland bryophytes

Andrew J. Franks

Summary

Franks, A.J. (2019). Charles James Wild (1853–1923), an ardent collector of Queensland bryophytes. ***Austrobaileya* 10(3): 383–404.** Charles James (C.J.) Wild was an early collector and documenter of the Queensland bryophyte flora. Born in Manchester in 1853 and trained as a joiner, Wild gravitated towards natural history before immigrating to the Queensland colony in 1883. Wild would become a familiar figure among the naturalist and scientific circles of Brisbane, becoming a member of a number of societies including the Royal Society of Queensland and the short-lived Natural History Society. He was in the employ of the Queensland Museum from 1889 until 1911 where his initial role was as an insect collector before becoming acting director (1905–1911). Wild has been commemorated in the names of several bryophyte and fern species, a species of butterfly, a moth, a gall midge and a fish. The location, significance and diversity of his bryophyte collections are detailed in addition to general insights into his life and times.

Key Words: Charles James Wild, Australian historical botany, Australian bryophytes, herbarium specimens, Queensland flora, Queensland Museum, Royal Society of Queensland, Natural History Society of Queensland

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Introduction

Those who are familiar with the bryophyte flora of Queensland would have most certainly come across early collections made by Charles James (C.J.) Wild. A contemporary of the more widely known colonial botanist Frederick Manson (F.M.) Bailey, Wild was an early collector and documenter of the Queensland bryophyte flora. While employed as an insect collector at the Queensland Museum, Wild's interests in natural history saw him not only collecting insects but also shells and bryophytes wherever he was sent. Bailey (1891) in his 'A Concise History of Australian Botany' provides a brief account of Wild stating that he travelled over a large area of the state and collected several new species. He is also given a brief mention in Ramsay's (2006) 'History of Research on Australian Mosses'. However, Wild is not listed in Maiden's (1909) 'Records of Queensland Botanists' nor in the *Australian Dictionary of Biography* (ADB 2006–2017). Despite this, his contribution to the early documentation of the Queensland bryophyte flora is significant and worthy of acknowledgement. It is hoped that this paper will shed some light on the life and times of this 'worthy student of nature and ardent naturalist'[9].

Materials and methods

An initial spreadsheet of Wild's plant collections was compiled from the Queensland Herbarium's (BRI) specimen database (Herbrecs). Details of specimens accessioned at other Australian herbaria were extracted from the *Australasian Virtual Herbarium* (AVH 2017). *JStor Global Plants* and online databases of a number of international herbaria were also queried for Wild specimens. The *United Kingdom General Register Office* was queried for records of birth and deaths of Wild, Wild's parents and brother. The *Queensland Registry of Births, Deaths and Marriages* was queried for details of Wild's marriage, birth of his children and death. *The National Library of Australia's* 'Trove' website (NLA 2009-onwards) has been used extensively, to find mentions of Wild, the Queensland Museum, the Natural History Society, and other relevant topics published in newspapers

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of the time. Scanned historical journals and articles were located through the *Biodiversity Heritage Library*. Mather's (1986) history of the Queensland Museum provided valuable insights into Wild's time with the museum. The Queensland Museum library holds all correspondence received and sent by Wild during his time of employment some of which were viewed for the preparation of this account. Herbarium abbreviations follow Thiers (continuously updated).

Results and discussion

Early History (1853–1883)

Charles James Wild (**Fig. 1**) was born on 19 March 1853 at Macclesfield, Cheshire, England to the south of Manchester[1]. Charles was the eldest child of Robert Wild (b. 1824, d. 1885), a joiner, and Hannah (*née* Salt, b. 1828, d. 1882). Two months later on the 22 of May he was baptised at Prestwich, Manchester[2]. At the time of Charles' birth, the Wild[i] family lived at Langford Street, Macclesfield. Charles' younger brother, Robert was born in 1859. By 1861 the Wild family were residing at Mill Hill, Newmarket, Suffolk and had been since Robert's birth two years prior[3]. Robert senior was employed as a carpenter and foreman at this time. Tragedy struck on July 9, 1867 when 8 year old Robert died of marasmus, a severe form of malnutrition characterised by a deficiency of protein[4]. Charles was 14 at the time of Robert's death. At this time, the Wild family were once again living in the north-west at 128 Cheetham Hill Road, Manchester. The 1871 census indicates that the head of the family, Robert, was employed as a joiner with his wife, Hannah, listed as a china dealer[5]. No occupation was listed for the then 18 year old Charles.

The Wild family were still residing at Cheetham Hill Road during the 1881 census with Robert now listed as a china and glass dealer and 28 year old Charles following in his father's footsteps and working as a joiner[6]. By this time, Wild had collected over 170 plant specimens, mainly bryophytes, from various locations in Wales, Scotland, and the north-west of England. These included type material for the liverwort *Gymnomitrion crassifolium* Carrington described by Benjamin Carrington from a specimen collected by Wild from Ptarmigan, Perthshire, Scotland during August 1878[7]. Carrington's article also describes one of many misfortunes that seemed to plague Wild's field endeavours throughout his career: "*Mr. Wild*, who was fortunate enough last summer to stumble upon it – literally – since it was after a fall producing severe injury to the knee, and making frequent rests necessary, that this gentleman collected the species…"[7].

To maintain and demonstrate their status, the lower middle class (to which the Wild family belonged) had to keep some semblance of a household (Anderson 1977; Loftus 2011). It was expected that a family would have at least one, if not more, domestic servants. In the lower-middle-class household, this may have consisted of a general servant. As is evident in the 1871 and 1881 census, the Wild household also included a general servant: 17 year old Cath Asply in 1871 and 24 year old Catherine Haskey in 1881[5,6]. The occupation of Charles' father, Robert, was variously listed as carpenter and foreman (1861 census), joiner (1871), and a glass and china dealer (1881). Only affording a single servant, the Wild household most likely fell within the lower middle-class. As such, the young Charles Wild may have been exposed to natural history in his leisurely pursuits outside of his working hours as a joiner.

A number of prominent English bryologists emerged from the burgeoning Victorian middle-class including many whose primary occupations were within the textile industry (Lawley 2015). The eminent

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[i] The spelling of the Wild surname varied throughout census records. In 1861 it was spelled as Wild. In 1871 it appears as Wylde and in 1881 as Wilde. Despite the variation in spelling, the household structure (Robert as head and Hannah as his spouse) and progression of ages remain consistent.

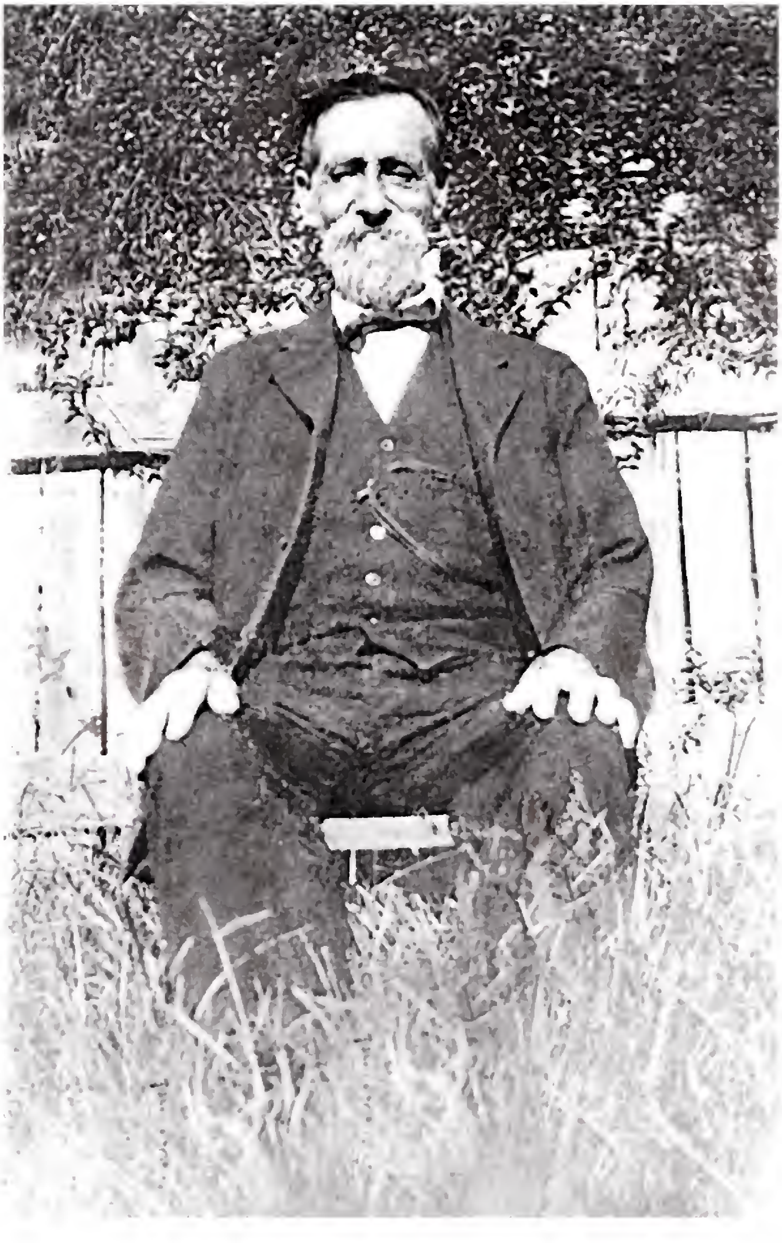

Fig. 1. Undated photograph of C.J.Wild. Original photograph has been lost. Reproduced by kind permission of the Queensland Museum from Mather (1986).

bryologist William Henry Pearson (1849–1923), for example, worked primarily as a yarn agent in Manchester and yet published the two volume *Hepaticae of the British Isles* (in 1899 and 1902) (Lawley 2015). Pearson and Wild collected a number of liverworts together from Wales during 1878 which are now accessioned in the Herbarium of the Royal Botanic Gardens of Edinburgh (E).

Based on specimens accessioned in a number of herbaria around the world, Wild's interest in bryophytes appears to have been a gradually growing affair. His likely first collections of bryophytes were two mosses, *Ptychomitrium polyphyllum* (Sw.) Bruch & Schimp. and *Ulota bruchii* Hornsch. ex Brid., made during 1874 by the 21 year old Wild from Millers Dale, Derbyshire. Wild then made three collections of *Racomitrium* species during 1875 followed by 10 specimens collected in 1876. During 1877, Wild was listed as an additional member of the Botanical Locality Record Club[8] and it was at this time that he started collecting bryophytes in earnest. Between 1877 and 1883 Wild collected over 250 specimens, mainly mosses and liverworts, from various locations in Wales, Scotland and the north-west of England.

Further to his interest in botany, Wild was also attracted to entomology and conchology and was an ardent student of other branches of science, including archaeology and ethnology[9]. In addition to being a member of the Botanical Locality Record Club, Wild's obituary lists a number of British learned societies in which he was an active member, including the Manchester Microscopical Society, Berwickshire Naturalists Club, Lancashire Botanists Association and Forfarshire Naturalists Society[ii].

On August 18, 1883, a little over a year after his mother's death, the 30 year old Wild boarded the Ducal Line 4-mast steamer, the *Duke of Devonshire* at Plymouth bound for the colony of Queensland. Wild never returned to his homeland.

Early days in Queensland (1883–1889)

The *Duke of Devonshire* arrived in Brisbane via Cooktown and northern ports on October 12, 1883[10]. A "Chas Wild" born "abt 1853" was listed as an assisted immigrant indicating that his passage was subsidised or paid for through one of several assisted immigration schemes which were in operation at the time. The Brisbane that welcomed Wild was far removed from the convict settlement of the early 1800s. By October 1883 Brisbane was a small, bustling metropolis with a population of around 47,000 people. Thomas McIlwraith, a conservative, was in the final throes of his time as Premier, about to be voted out of office the following month and replaced by Samuel Walter Griffith. In 1883 the Queensland Colonial Botanist, F.M.Bailey, published *A Synopsis of the Queensland Flora* in which he recorded about 140 species of bryophytes (Bailey 1883). In his synopsis, Bailey describes the features of each genus and then lists the species within each genus that had been reported for Queensland (Lepp 2012). Species descriptions and illustrations were not included. The Synopsis was followed by three supplements (in 1886, 1888 and 1890) which recorded additional species with the third supplement (Bailey 1890) including illustrations of some bryophyte species.

Wild's vocation during his early days in the colony is unclear; however, as an assisted migrant, he most likely initially worked in his trade. If Wild's specimen collection dates are correct, he almost immediately made his way to Toowoomba collecting 20 bryophyte specimens in this locality during November 1883[11]. A major storm passed through Toowoomba on the 11 of

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[ii] While Wild's obituary lists a number of societies to which he supposedly belonged, I found no evidence of his membership or whether some of these learned societies actually existed. However, his accessioned specimens do reflect that he collected over a broad area and if the collection dates are accurate indicates that he visited Wales and Scotland a number of times presumably as part of one these societies.

November[12] and perhaps joiners were in demand to repair damaged buildings in the region. Between 1884 and 1885, Wild made a handful of bryophyte collections from the Brisbane Botanic Gardens (three specimens) and Enoggera (12 specimens)[11]. His interest in shells remained prominent with the curator of the Queensland Museum reporting to the Board of Trustees that "Mr. C.J.Wild" donated 16 shells to the museum collected from Comboyuro (Moreton Island)[13].

On Wednesday, October 6, 1886, the first meeting of the Field Naturalists Club was convened, this being a section of the Royal Society of Queensland[14]. F.M.Bailey was elected chairman of the section and conducted the section's first excursion three days later to the Queensland Acclimatisation Society gardens at Bowen Park. On November 13, 1886, the Field Naturalists Club undertook an excursion to swamp lying between the Brisbane River and racecourse (Hamilton) then towards Nundah. It appears highly likely that Wild was part of this excursion as specimens of *Sematophyllum subhumile* (Müll.Hal.) M.Fleisch. and *Cephaloziella hirta* (Steph.) R.M.Schust. were collected by him from Hamilton and Toombul respectively during November 1886, the latter forming material for the type specimen.

1887 was the start of a relatively intensive period of bryophyte collecting by Wild. Between May and August 1887, Wild collected 177 specimens of 93 taxa, mainly from the Pimpama and Beenleigh region south of Brisbane. Included in these collections were the type materials for the following taxa: *Lepidozia reversa* Carrington & Pearson (= *Kurzia reversa* (Carrington & Pearson) Grolle), *Lejeunea wildii* Steph. (= *Acrolejeunea securifolia* (Nees) Steph. & Watts) and *Fissidens arboreus* Broth. (= *F. oblongifolius* var. *hyophilus* (Mitt.) Beever & I.G.Stone). In addition to the numerous bryophyte specimens collected by Wild from Pimpama, it appears that he also collected a number of insects and shells. The monthly meeting of the Queensland Museum board of trustees held during October 1887 notes that "Mr. J.Wild" donated a miscellaneous collection of insects from Pimpama and "Mr. W.Wild" donated a number of "land and fresh water shells from Pimpama, including eight species of helix and shells, representing a single species of each of the following genera, namely *Balinus*, *Physa*, *Lymnaea*, *Bithynia*, *Planorbis*, and *Valvata*"[15].

Wild would become a familiar figure among the naturalist and scientific circles of Brisbane as a member of a number societies including the Royal Society of Queensland, Queensland's first scientific society, formed in 1884, arising from the Queensland Philosophical Society (RSQ 2017). On the evening of September 9, 1887, the Royal Society of Queensland held its monthly meeting in the Queensland Museum library with "Mr. J.C.Wild" listed among the visitors[16]. This appears to be the start of a long association between Wild and the Royal Society of Queensland.

From October 1887 into the first half of 1888, Wild appeared to shift his focus to areas north of Brisbane, making numerous collections of bryophytes mainly from the Burpengary and Deception Bay area including type materials of *Fissidens calodictyon* Broth. (= *F. beckettii* Mitt.) and *Macromitrium mucronulatum* Müll.Hal. (= *M. brevicaule* (Besch.) Broth.). Again, the monthly meeting notes of the Queensland Museum board of trustees convened in January and March 1888 record that Wild made donations of various land and marine shells collected from Burpengary[17,18]. These Burpengary collections may allude to Wild's association with Dr. Joseph Bancroft as Bancroft had purchased 150 acres of land on Burpengary Creek during 1881, and subsequently extended this by purchasing sea-front land at nearby Deception Bay (Pearn 1992). By 1890, Bancroft owned 3,780 acres of relatively fertile land in this area where he established a pemmican meatworks, a cultured pearl enterprise, and experimental plots of sugarcane, rice, wheat and barley (Pearn 1992). In his day, Joseph Bancroft was one of Queensland's leading scientists, being at various times vice-president of the Australasian Association for the Advancement of Science and president of the Queensland Medical Board, the Royal Society of Queensland and the Medical Society of Queensland (ADB 2006–2017). Wild's obituary states that he spent some time with "Dr. Bancroft in the southern districts", which may refer to this period[9].

Wild also made two moss collections from Three Mile Scrub during July 1888. Bancroft's *Kelvin Grove* homestead was situated on five hectares of land on the banks of Enoggera Creek at the Three Mile Scrub (Pearn 1992). In the latter half of 1888, Wild collected 29 specimens from Woolston Scrub (**Fig. 2**) during a Field Naturalists' excursion to this now extirpated patch of vineforest on the banks of the Brisbane River, "extending from a point almost directly west from Woolston Railway Station, two or three miles towards Goodna" (Simmonds 1888). This included type material for the genus *Wildia* Müll.Hal. & Broth., named in Wild's honour. *Wildia solmsiellacea* Müll. Hal. & Broth. is now reduced to synonymy as *Solmsiella solmsiellaceum* (Müll.Hal. & Broth.) I.G.Stone.

"Mr. C.J.Wilde" was proposed as a subscribing member to the Royal Society of Queensland by Mr. Watkins and seconded by Mr. C.Hedley during the monthly meeting held on August 17, 1888[19]. Wild's membership was accepted with "C.J.Wild, esq." listed as a new member of the Royal Society of Queensland on September 11, 1888. On Friday October 12, 1888, the then 35 year old Wild presented a paper at the monthly Royal Society of Queensland meeting in the offices of the Education Department on Edward Street, Brisbane entitled 'Description of new mosses and hepatics'[20]. The following month, Wild contributed another bryological paper to the Royal Society of Queensland meeting called 'A new list of hepatics'[21]. Wild's first five years of collecting bryophytes in the south-eastern part of the colony culminated in the publication of three articles in the 1888 *Proceedings of the Royal Society of Queensland* (Wild 1888a, 1888b, 1888c). These appear to be Wild's first published papers and were additions, descriptions or corrections to the bryophyte species list presented in Bailey's Synopsis, and the first and second supplements. Wild (1888a) offers this extraordinary claim in his first article:

> *"The Queensland moss flora, a very small one, should not offer many difficulties in the compilation of a mere list".*

It appears likely that Wild corresponded and exchanged specimens with British and European bryologists particularly Benjamin Carrington, Franz Stephani, Karl Müller, and Viktor Brotherus due to the authorship of new species names based on material collected by Wild and his peers. Two letters written by Wild to the Finnish bryologist Brotherus are available in the Research Library of the National Library of Finland. Wild penned his first letter to Brotherus on September 3, 1888 where he asks for assistance with the study of Queensland mosses.

> *Brisbane Sept^r 3^rd 88*
>
> *Dear Sir*
>
> *Can you assist me in the study of Australian mosses, 1st by authentic specimens correctly named, 2nd by descriptions of such species as you have named which are not yet published, 3rd by naming specimens which I could send you from time to time. I have about 120 species of Queensland mosses named, and about 30 species unnamed, many of them new to science. If any of those that I should send proves to be new I should expect a description of it, I could get it printed here, in all cases you should have due honor [sic] as the describer, if in addition you drew a figure of it, I will take the pains to get it lithographed. Much confusion as been caused here owing to species being named by various specialists, and no descriptions being published, or else in various works scattered over the world in many different languages. I think each species should be described in Latin and the remarks in the language spoken were [sic] the plants were found. I could send you mosses in quantity if you required them. Could I obtain type specimen of mosses named by Dr. Karl Mueller. Could you point out to me the difference between Phyllogonium elegans Hampe (Acroceratium politum Hook. & Wils.) & Acroceratium cymbifoloides C.Mueller; even under an [sic] high power I can detect no difference.*
>
> *I remain Yours Faithfully*
>
> *C.J.Wild*

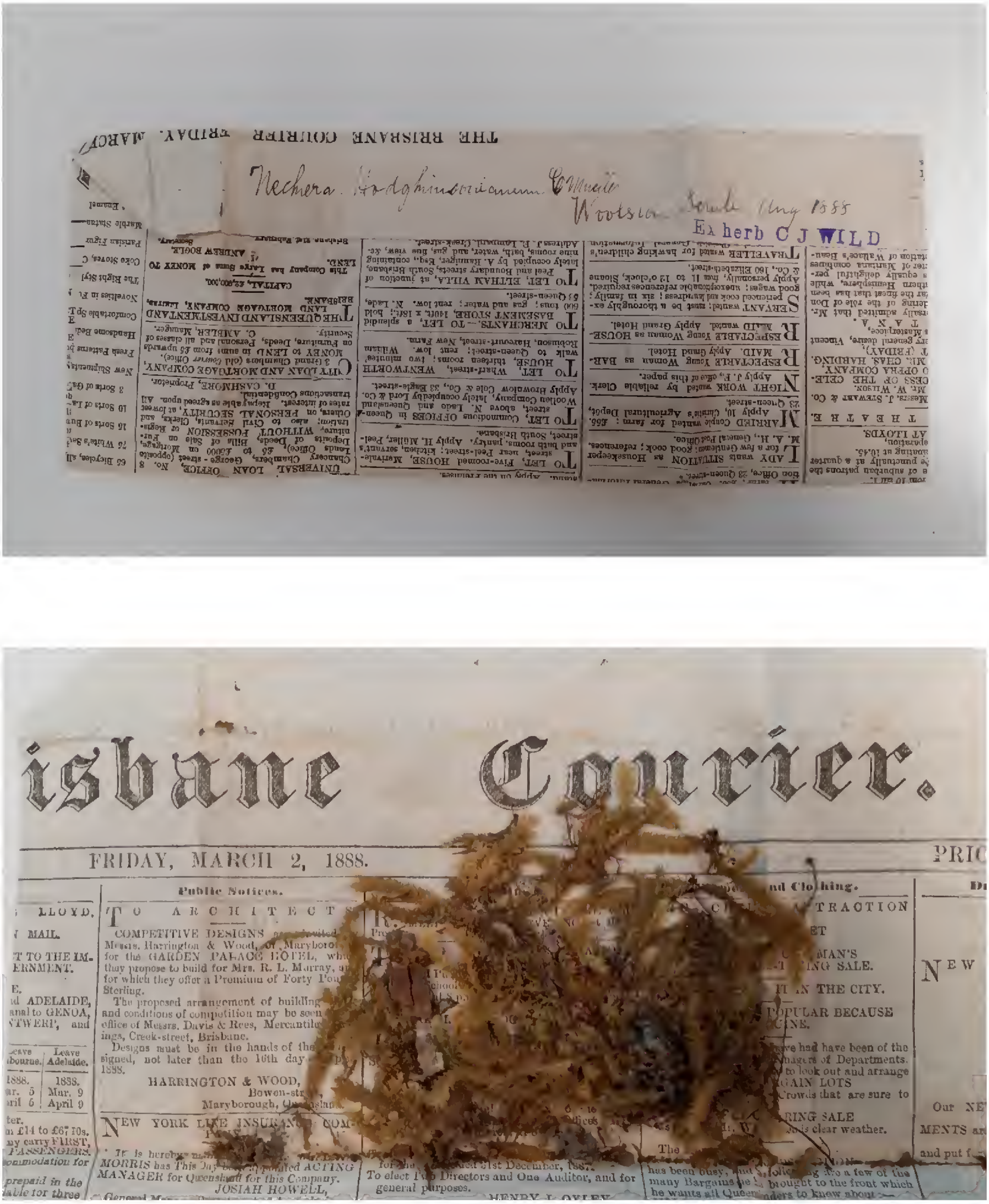

THE BRISBANE COURIER
Neckera Hodgkinsonianum C.Muell.
Woolston Scrub Aug 1888
Ex herb C J WILD
isbane Courier.
FRIDAY, MARCH 2, 1888.

Fig. 2. Collection of ***Calyptothecium recurvulum*** (BRI [AQ642216]) made by C.J.Wild from Woolston Scrub, August 1888. Many of Wild's collections at the Queensland Herbarium remain in the original packet used for collection, in this case a page from The Brisbane Courier, 2 March 1888.

On October 22, 1888 the Field Naturalists Club held an excursion to a number of scrub areas around Caboolture. Again, it appears that Wild was in attendance as 12 bryophyte specimens were collected by him from Caboolture during October. As 1888 drew to a close, Wild collected 40 bryophyte specimens from Helidon and Highfields including type materials for *Barbula wildii* Broth. (= *Didymodon tophaceus* (Brid.) Lisa), *Plagiobryum wildii* Broth. (= *P. cellulare* (Hook.) J.R.Spence & H.P.Ramsay), and *Weissia squarrosa* Broth. ex F.M.Bailey (= *Barbula subcalycina* Müll.Hal.). In total Wild collected 185 bryophyte specimens during 1888 in addition to the shells that were donated to the Queensland Museum conchological collection.

The Museum Years (1889-1911)

During early January 1889, the curator of the Queensland Museum, Charles de Vis, offered to allocate his Sunday allowance to support a new insect collector position if a subordinate could replace him in the museum on Sundays (Mather 1986). De Vis' offer motivated the museum's Board of Trustees to allocate contingency funds to support the temporary position of a collector (Mather 1986). Hence, on January 14, 1889, the 36 year old Wild was appointed to the Queensland Museum as an insect collector on 30 shillings per week.

In his monthly report to the board of trustees, de Vis reported that the "newly appointed insect collector (Mr. Wild) displays most commendable zeal and his success so far is promising"[22]. On February 11, Wild penned a second letter to Brotherus thanking him for copies of articles sent in response to his first letter. He also asks whether he could send specimens for determination, "if you agree to such conditions I will send you specimen of every moss which I have collected and am unacquainted with, they number at least 60". Wild also asks for Brotherus to "clear up the confusion that at present seems to surround *Rhizogonium mossmanianum* C.Muell." and states his intention "to translate your description of the 3 new species (to Queensland) of mosses for the next meeting, Royal Society & get them published in the proceedings"[23].

The Royal Society convened their next monthly meeting during the evening of Friday 15 February at the offices of the Education Department on Edward Street. Wild delivered a paper entitled 'Bryological Notes' in which he "gave a description of five new mosses and a new hepatic, and, by permission of F.M.Bailey, reported three other new mosses collected by the writer"[24]. In this paper, and the subsequent article appearing in the Proceedings (Wild 1889), Wild did indeed provide a translation of Brotherus' newly described species of moss collected by Bailey, these being: *Splachnobryum baileyi* Broth. (= *S. obtusum* (Brid.) Müll.Hal.), *Meteorium baileyi* (Broth.) Broth. (= *M. polytrichum* Dozy & Molk.), and *Isopterygium robustum* Broth. (= *Taxiphyllum taxirameum* (Mitt.) M.Fleisch.). He also included descriptions of *Macromitrium pusillum* Mitt. (= *M. archeri* Mitt.) and *Rhizogonium paramattense* (Müll.Hal.) Reichardt (= *Pyrrhobryum paramattense* (Müll.Hal.) Manuel). Wild also listed additional species described by Karl Müller based on material collected by Wild which were forwarded to Müller by Bailey (Wild 1889).

The monthly curators report to the museum's Board of Trustees in March 1889 stated that the insect collector (Wild) had made satisfactory progress during the past month, with "his collection numbering in all 2,234 specimens"[25]. However, it is apparent that Wild was not only collecting insects, as was his requirement, but also collecting bryophytes and shells. Wild's bryophyte specimens collected during March and April 1889 had him around the Nerang and Mudgeeraba area of what would later become known as the Gold Coast. De Vis' April report to the board states that "the insect collector is pursuing his work in the vicinity of Nerang, but reports that it is not rich in insect life and that it will be necessary for him to proceed to another locality"[26]. Unfavourable weather the following month prevented Wild continuing collecting insects and necessitated his return to Brisbane[27]. After only four months with the museum, Wild wrote to the trustees requesting an increase of his salary, stating "it is not possible for me to meet expenses on the amount I am now paid".

Early in June, F.M.Bailey departed Brisbane for Cairns on the *Elamang* as part of Archibald Meston's ascent of the Bellenden Ker range (Dowe & Broughton 2007). Bailey was the expedition botanist and he collected prodigiously during the exploration of the range, with his collections including many bryophyte specimens (Dowe & Broughton 2007). This was the first significant collection of bryophytes from the Wet Tropics region of north Queensland. After a brief sojourn back in Brisbane, Wild was once again dispatched to the southern parts of the colony to collect insects, this time around Burleigh Heads. As was his want, he also collected bryophytes and shells with the curator's monthly report stating that the "officer in charge of the conchological department reports having received a large and varied collection of shells from the museum collector, Mr. C.Wild, who has been pursuing his duties in the neighbourhood of Burleigh Heads"[28]. In a letter to de Vis penned on the 13 of July, Wild states that he had "collected and prepared over 3000 specimens representing 33 species of shells". By September, Wild was again collecting north of Brisbane with de Vis reporting that "the insect collector reports having had good success at the Glasshouse Mountains"[29].

On July 1, 1890, the ship *Warrego* departed Brisbane for Burketown via northern ports with Wild listed as a passenger[30]. Wild had been dispatched to north Queensland by the museum to collect insects, especially along the railway being constructed between Cairns and Herberton (Mather 1986). He was to remain in the area for 16 months and collected some 290 plant specimens with almost half being bryophytes. While the museum's insect collection "today bears little evidence of specimens" from Wild's time in the north (Mather 1986), his collection of bryophytes represent the first major collection of these plants from the Wet Tropics adding to the 70 specimens that Bailey collected from the Bellenden Ker range expedition the previous year.

Wild appears to have had some success with his insect collecting in the north, with the curator reporting to the museum's Board of Trustees that "Mr. Wild managed to secure no less than seventy-eight [butterflies] during the month of October only, a number which no doubt could have been augmented had common insects already sent down been included" and that "Mr Wild adds twenty to the number of butterflies already procured by him in the Cairns district"[31]. It appears that Wild made regular consignments from the Cairns region with the February 1891 review of accessions to the museum noting that "the insect collector (Mr. Wild) has filled another consignment from the Cairns district. In this collection the butterflies, which have yet to be examined, comprise about sixty species. Among them are several rare and interesting insects, and one entirely new to science has been named by Mr. Miskin, and will be noticed in that naturalist's forthcoming work on the butterflies of Australia"[32]. Museum trustee Miskin was an amateur lepidopterist, describing butterflies collected by Wild in the Cairns area and naming them in Wild's honour (Mather 1986). Hence the oakblue butterfly, *Arhopala wildei* and the moth *Ambulyx wildei* are named for Wild although being a consistent misspelling of his surname.

Wild appeared to be diligently fulfilling his role in the north during the early part of 1891, by forwarding "a large and well filled box of insects of all orders, the product of his work at Cairns during the month of February. This collection is especially rich in the smaller species, and contains many novelties"[33]. On March 20, 1891 it was announced that F.M.Bailey, C.Hedley of the museum, and Wild had been made fellows of the Linnean Society of London[34]. In June, the assistant curator reported that the museum's insect collections had been "principally enriched by the exertions of the entomological collector, Mr. C.J.Wild"[35]. The report in August was much less encouraging, stating that nothing was received from the collectors in the field with Wild having the "ill fortune to lose his collecting gear from the back of a runaway packhorse"[36]. Wild had planned to ascend Mt Bartle Frere with Mr. G.Clark but the loss of his packhorse on the way to the Mulgrave River curtailed this plan[37]. After this unfortunate event, Wild was instructed "to travel less continuously but as a rule remain in each locality for not less than 3 months" (Mather 1986). A little later it was thought "advisable that the insect collector should be transferred to some other fields of labour" and he was recalled to Brisbane (Mather 1986). Wild arrived back in Brisbane on board the *Aramac* on November 5, 1891 thus ending his time in the north[38]. What is particularly intriguing is that after his efforts in north Queensland, Wild largely ceased collecting bryophytes with only two additional specimens being collected after 1891.

During the Royal Society of Queensland's meeting held on December 11, 1891, Mr. Watkins read a short paper on behalf of Bailey entitled, 'Remarks upon some botanic specimens, chiefly ferns, obtained by Mr. C.J.Wild F.L.S., of the Queensland Museum, while collecting insects in tropical Queensland'[39]. Wild presented two mosses to the meeting, these being *Braunia humboltii* (Hook.) Hook.f. (= *Rhacocarpus purpurascens* (Brid.) Paris) and *Hypopterygium pallens* (Hook. f. & Wilson) Mitt. (= *Lopidium concinnum* (Hook.) Wilson)[40]. It is not apparent where Wild obtained these specimens.

By 1891, excursions by the Field Naturalists section of the Royal Society of Queensland had become increasingly irregular (Dowe 2017). As a response, a meeting was convened by Wild's museum colleague Henry Tryon on Thursday, January 14, 1892 to form a natural history society with the motion, "that we, as students of natural history, constitute ourselves that Natural History Society of Queensland"[41]. Wild was elected as a member of council[41]. The Natural History Society held its first excursion nine days later to Butcher's Paddock, Indooroopilly with those in attendance "armed with the usual entomological and geological impediments"[42]. It appears that at this time Wild shifted his energies away from the Royal Society and focused more on the newly formed Natural History Society by exhibiting "a fine collection of hemiptera, captured by him in Victoria Park" in February[43] and then "a large number of ferns collected by him in the Cairns and Herberton districts" in March[44]. At the April meeting of the society, Wild displayed microscopical slides of fern sections and mosses[45] and in June "exhibited the more interesting of the plants obtained by him during the recent excursion of the members to Dunwich [North Stradbroke Island]"[46].

Wild, now 39, wedded 24 year old Jessica (Jessie) Walker Marshall (b. 1869 Dundee, Scotland, d. 1928 Dalby) on Wednesday July 27, 1892 at the residence of Mrs. Peardon in Bowen Street, Spring Hill, Brisbane[47]. Jessie had arrived in Brisbane from Scotland on board the *SS Gulf of Carpentaria* seven years prior in 1885. Wild apparently still harboured an interest in bryophytes as at the August meeting of the Natural History Society, he displayed "a named series of living specimens of mosses and hepatics, comprising twenty species of the former and eight of the latter" collected by him "during lunch hour, within half a mile of the museum"[48]. At this time the museum was located at William Street in Brisbane near the banks of the Brisbane River. In December 1892, after four years of temporary employment, Wild was placed on the permanent staff after both de Vis and trustee Joseph Bancroft spoke in his favour (Mather 1986).

Disaster struck Brisbane during February 1893 in the form of a major flood followed by financial depression. Wild was one of two museum staff kept on when drastic retrenchments occurred as a consequence of the depression (Mather 1986). On May 27, 1893, the Wilds welcomed their first child, a daughter named Jessie Adelaide. During May, Wild made his first bryophyte collection in almost a year, collecting a *Dendroceros* found growing upon the branches and trunks of trees at Mt Tamborine. He later exhibited the fertile specimen at the July Natural History Society meeting, commenting that it "agreed in every particular with Queensland examples of a species of the genus kindly communicated by Baron von Mueller, and which it was thought represented Stephani's species *Dendroceros Muelleri*"[49]. Wild would later describe this as a new species: *Dendroceros subtropicus* (Wild 1893). This was Wild's only foray into the field of taxonomy.

Wild's role at the museum changed in September 1893 with his position transforming from insect collector to messenger on the salary of £104/yr[50]. Due to a vacancy arising in the council of the Natural History Society, Wild was elevated into the role of vice president. He remained very active within the Natural History Society throughout 1894, often chairing meetings or exhibiting items. During October's meeting, Wild read a paper on Confectionary Pests related to the "beetles *Rhizopertha pusilla* and *Sylvanus surinamensis* found infesting different forms of chocolate met with in Brisbane in confectioners' trade samples"[51].

The Wilds, now residing at Stoneleigh Street, Albion, welcomed their second daughter, Evelyn Kate on November 18, 1894. By 1895, Wild's position at the museum had once again become temporary where he was still performing the role of messenger. The Natural History Society convened a conversazione and microscopical display during August 1895. Of the ten microscopes provided by members for the "entertainment of the visitors", four were owned by Wild and displayed "chiefly botanical species, showing fresh water sponge with ova-bearing cells, paper mildew and fern sections"[52]. At the annual meeting of the Natural History Society held on January 23, 1896, Wild was elected as honorary treasurer[53]. Wild was still employed as a messenger at the museum when he and Jessie welcomed their third daughter Vera Christina Hannah on October 28, 1897.

Wild also had interests outside of natural history including stamp collecting and chess. He was elected as "exchange superintendent" at the first meeting of the Brisbane Philatelic Society on October 28, 1897[54] and appears to have been a member of the Eagle Junction Chess Club[55]. Wild also appears to have been a teetotaller, appearing at various times in the councils of the Good Templars[56], Queensland Temperance Alliance[57] and later the Independent Order of Rechabites[58].

The economic depression of 1893 continued through the 1890s with the museum operating on a skeleton staff of five with everyone performing multiple tasks (Mather 1986). Wild spent his Easter of 1899 collecting some 150 insect specimens from the Toowoomba area (Mather 1986). In 1899, he was sent to Cunnamulla to undertake a mosquito collection to be forwarded to the British Museum (Mather 1986). Late in 1899, the museum relocated from William Street to the purpose built exhibition building at Bowen Park, Bowen Hills (Mather 1986).

By 1901, the museum's staff had increased to nine with Wild once again returned to permanent staff (Mather 1986). Wild successfully sought a change to his position title and on July 1, he was appointed to the museum as an entomologist on a salary of £150/annum[59] with de Vis' role redefined from curator to director (Mather 1986). Although now listed as an entomologist, Wild never published in entomology. Charles Robert Daniel, the Wild's forth child, was born on March 4, 1902. The following month saw another round of retrenchments with the museum staff reduced to de Vis, zoological collector K.Broadbent, Wild and mineralogist J.A.Smith (Mather 1986). By 1903, the growing Wild family had moved to Eliza Street in Noble Estate, Clayfield[60]. Wild then became active in the 'Clayfield Progress Association', in regular attendance at their meetings.

De Vis' retirement from the director position of the museum was filled by the government of the day by promoting the 52 year old Wild to "Acting Director" effective from August 21, 1905[61]. This was accepted by the museum's board of trustees on August 26 (Mather 1986). Hence, the joiner originally from Manchester with no formal scientific training was placed in charge of Queensland's premier scientific institution. As Mather (1986) laments, "Wild appears to have been a man of modest ambition and ability of whom too much was asked" and in an acting capacity, he directed the museum into a period of stagnation.

After the cessation of the Natural History Society sometime after 1896, Wild appeared to drift back to the Royal Society of Queensland, noted as displaying a "valuable exhibit of ethnological species found in New South Wales" during their monthly meeting in October 1906[62]. By 1909, his salary as Acting Director of the museum was up to £190/annum[63]. If the collection date is correct, a specimen of the moss *Gigaspermum repens* (Hook.) Lindb., collected by Wild at Kangaroo Point during 1909 may be the last bryophyte specimen he made.

By 1910 the Queensland Government was becoming increasingly concerned at the lack of progress of the museum, with the then premier William Kidston writing to his contemporary in New South Wales asking if Robert Etheridge jnr, the curator of the Australian Museum in Sydney, would be available to undertake a review of the run-down museum and report back to him (Mather 1986). While Etheridge paid compliment to some of the museum's collection, his report was scathing of the building, the lack of labels, crowding of specimens, inadequate display furniture, arrangement of the material, preparation of the specimens, registration, storage, the level of staffing and the staff themselves, particularly Wild (Mather 1986).

As a result of Etheridge's review, Dr. Ronald Hamlyn-Harris, the 36 year old science and German master at Toowoomba Grammar School and a formally educated entomologist, was appointed by the government as the Director of the museum effective from October 1, 1910 (Mather 1986). Hamlyn-Harris was also the foundation president of the Toowoomba Field Naturalists' Club[64]. Upon appointment he undertook to implement the recommendations made by Etheridge to revitalise the museum with the backing of the Kidston government (Mather 1986). He reorganised the museum's scientific work and the presentation of its collections, expanded its publications and arranged an extensive programme of public lectures[64] essentially transitioning it from a mere collection of curios into a modern scientific institution. Three days after Hamlyn-Harris' appointment, Wild, in the absence of the director, received delegates of the Australian Ornithologists' Union meeting as visitors to the museum[65]. The following day he departed with D.B.Fry of the Australian Museum on the federal trawler *Endeavour* bound for Port Curtis where they searched for new specimens of fish and marine invertebrates[66].

No longer Acting Director, Wild resumed his former position of insect collector on February 2, 1911 for a probationary period of three months (Mather 1986). Hamlyn-Harris was far from impressed with Wild and his time with the museum was clearly coming to an end. In late March 1911, the 58 year old Wild was dispatched alone by Hamlyn-Harris to primarily collect large insects from the Blackall Range region, north of Brisbane (Mather 1986). As it was entering the cooler months when insects, particularly large ones, are rarely found, Wild's progress was poor (Mather 1986). As the greater portion of his time in the past decade was office based, Wild was ill-prepared for this undertaking. His progressive misfortune and misery is evident in his numerous letters to Hamlyn-Harris during this time:

> *1st April (Landsborough): "I had a fall on the bank of the creek in my anxiety to secure a specimen",*
>
> *10th April (Palmwoods): "I am sorry my efforts have not met with your approval. If the specimens are not in the locality in which I am collecting it is impossible to get them. As there was a dearth of large or even moderately sized insects at Landsborough during my stay there I turned my attention to capturing the smaller ones",*
>
> *11th April (Palmwoods): "This seems to me to be an ideal spot for collecting. It is a pity it was not the end of September or beginning of October [as] the nights are very cold and I am afraid it will interfere with the collecting",*
>
> *15th May (Nambour): "For more than a week I have been very unwell for many days did not know how to put one foot before another, for the last three days I have nothing to eat",*

> *26th May (Maleny): "There was a bitter frost here this morning",*
>
> *30th May (Maleny): "It is so cold that in the early morning I can hardly hold the gun"* (Mather 1986).

On June 5, a fire swept through Wild's camp at Woodford destroying everything including his tent, clothing, food, and notebooks. A police enquiry into this event requested by Hamlyn-Harris concluded that the fire had originated from Wild's own camp fire (Mather 1986). A week later (June 12th) Wild wrote again to Hamlyn-Harris offering to accept a transfer to a position in another government department (Mather 1986).

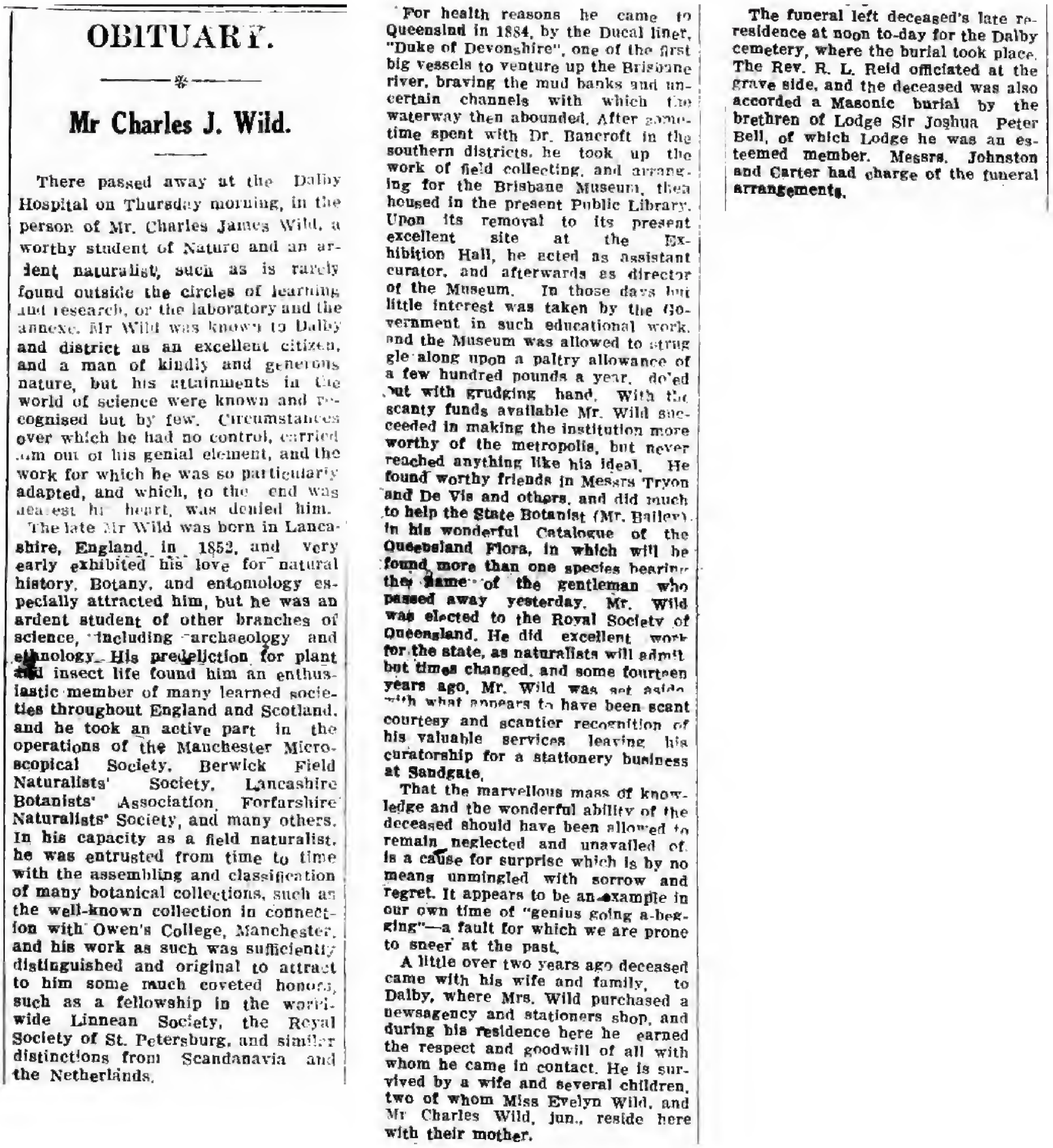
On June 15, despite knowing full well that all of Wild's notebooks were destroyed in the Woodford fire, Hamlyn-Harris demanded a comprehensive report from Wild on the Blackall Range collecting trip. Wild's frustrations are evident in his response sent a few days later: "Much of my time was taken up through having to visit the local Post Office daily to receive or dispatch letters, or enquire at the Railway Station for parcels, or to dispatch parcels therefrom. Such visits were at very inconvenient times, mostly in the middle of the day. Owing to various disabilities under which I executed the collecting, including having to do my own cooking, fetching supplies, procuring water, the cold weather, frequent changes of camp, "which sometimes took days" and attempting to comply with your diverse memos, I consider the results are all that could be expected".

Despite Wild's offer to accept a transfer he was summarily dismissed from the museum, after Hamlyn-Harris opined to the undersecretary that "Mr Wild is simply wasting his time and ours" (Mather 1986). Thus, on July 31, 1911, Wild's 22 year association with the museum ended. As his obituary opines, he "was set aside with what appears to have been scant courtesy and scantier recognition of his valuable services"[9].

Twilight Years (1912-1923)

After his dismissal from the museum, Wild completely turned his back on natural history, returning briefly to his original trade. Still residing at Eliza Street, Clayfield, the 1912 electoral roll had Wild listed as a carpenter and Jessie performing "home duties"[67]. By the following year, the Wild family had moved from Clayfield to Loudon Street, Sandgate with Charles listed as a joiner and Jessie as a shopkeeper[68]. A number of advertisements during late 1914 and early 1915 had Wild attempting to sell or let various properties, including: a six room house at Clayfield[69], land and a furnished or unfurnished house at Sandgate[70], and a shop with dwelling at Sandgate[71]. By 1917, the Wild family had relocated to Rainbow Street, Sandgate with Charles being the proprietor of the local stationary business[72]. Wild's eldest daughter, Jessie married Hinton Johns with a "dainty wedding breakfast" served after the ceremony at the Wild residence[73]. Later in April, Wild was advertising for a "pony, lady to drive" with applications directed to "Sandgate Central, opposite Post Office"[74].

The 1919 electoral roll had the Wild's still residing at Rainbow Street with Charles listed as an "agent" and Jessie as performing "house duties"[75]. Wild's youngest daughter Vera wedded Walter Holman at the Sandgate Presbyterian Church on March 17, 1920[76]. During July, 1921, Wild was advertising an unfurnished house to let for 25 shillings per week[77]. This may have been the Rainbow Street residence as the following year Wild, Jessie, Evelyn and Charles jnr. were residing at Roche Street, Dalby[78] after Jessie purchased a newsagency and stationers shop there. On August 21, 1923 the 70 year old Wild presented as a patient in the Dalby Hospital[79] where he remained until his death on September 27[80]. His death was attributed to "arbitral disease"[80]. Wild was buried the following day at Dalby Cemetery and accorded a Masonic burial by the brethren of the Dalby lodge of which he was a member[81]. Wild's obituary (**Fig. 3**) printed in the Dalby Herald offers an interesting perspective on Wild, written by someone who appears to have intimate knowledge of his life and times.



OBITUARY.

Mr Charles J. Wild.

There passed away at the Dalby Hospital on Thursday morning, in the person of Mr. Charles James Wild, a worthy student of Nature and an ardent naturalist, such as is rarely found outside the circles of learning and research, or the laboratory and the annexe. Mr Wild was known to Dalby and district as an excellent citizen, and a man of kindly and generous nature, but his attainments in the world of science were known and recognised but by few. Circumstances over which he had no control, carried him out of his genial element, and the work for which he was so particularly adapted, and which, to the end was nearest his heart, was denied him.

The late Mr Wild was born in Lancashire, England, in 1852, and very early exhibited his love for natural history. Botany, and entomology especially attracted him, but he was an ardent student of other branches of science, including archaeology and ethnology. His predeliction for plant and insect life found him an enthusiastic member of many learned societies throughout England and Scotland, and he took an active part in the operations of the Manchester Microscopical Society, Berwick Field Naturalists' Society, Lancashire Botanists' Association, Forfarshire Naturalists' Society, and many others. In his capacity as a field naturalist, he was entrusted from time to time with the assembling and classification of many botanical collections, such as the well-known collection in connection with Owen's College, Manchester, and his work as such was sufficiently distinguished and original to attract to him some much coveted honors, such as a fellowship in the world-wide Linnean Society, the Royal Society of St. Petersburg, and similar distinctions from Scandanavia and the Netherlands.

For health reasons he came to Queenslnd in 1884, by the Ducal liner, "Duke of Devonshire", one of the first big vessels to venture up the Brisbane river, braving the mud banks and uncertain channels with which the waterway then abounded. After sometime spent with Dr. Bancroft in the southern districts, he took up the work of field collecting, and arranging for the Brisbane Museum, then housed in the present Public Library. Upon its removal to its present excellent site at the Exhibition Hall, he acted as assistant curator, and afterwards as director of the Museum. In those days but little interest was taken by the Government in such educational work, and the Museum was allowed to struggle along upon a paltry allowance of a few hundred pounds a year, doled out with grudging hand. With the scanty funds available Mr. Wild succeeded in making the institution more worthy of the metropolis, but never reached anything like his ideal. He found worthy friends in Messrs Tryon and De Vis and others, and did much to help the State Botanist (Mr. Bailey) in his wonderful Catalogue of the Queensland Flora, in which will be found more than one species bearing the name of the gentleman who passed away yesterday. Mr. Wild was elected to the Royal Society of Queensland. He did excellent work for the state, as naturalists will admit but times changed, and some fourteen years ago, Mr. Wild was set aside with what appears to have been scant courtesy and scantier recognition of his valuable services leaving his curatorship for a stationery business at Sandgate.

That the marvellous mass of knowledge and the wonderful ability of the deceased should have been allowed to remain neglected and unavailed of, is a cause for surprise which is by no means unmingled with sorrow and regret. It appears to be an example in our own time of "genius going a-begging"—a fault for which we are prone to sneer at the past.

A little over two years ago deceased came with his wife and family, to Dalby, where Mrs. Wild purchased a newsagency and stationers shop, and during his residence here he earned the respect and goodwill of all with whom he came in contact. He is survived by a wife and several children, two of whom Miss Evelyn Wild, and Mr Charles Wild, jun., reside here with their mother.

The funeral left deceased's late reresidence at noon to-day for the Dalby cemetery, where the burial took place. The Rev. R. L. Reid officiated at the grave side, and the deceased was also accorded a Masonic burial by the brethren of Lodge Sir Joshua Peter Bell, of which Lodge he was an esteemed member. Messrs. Johnston and Carter had charge of the funeral arrangements.

Fig. 3. C.J. Wild's obituary in The Dalby Herald (Qld), 28 September 1923.

Conclusion: Botanical Legacy

During his lifetime, Wild collected over 1100 plant specimens, the majority of which were bryophytes (939 specimens) (**Fig. 4**). These specimens are variously accessioned at the Herbarium of the University of Manchester (MANCH), Fielding-Druce Herbarium, University of Oxford (OXF), World Museum Liverpool (LIV), the British Museum of Natural History (BM), the Royal Botanic Gardens Edinburgh (E), the British Bryological Society herbarium (BBSUK) housed at the National Museum of Wales, University of Wales (ABS), Conservatoire et Jardin botaniques de la Ville de Genève (G), the Finnish Museum of Natural History (H), the New York Botanic Gardens (NY), the United States National Herbarium (US), the National Herbarium of New South Wales (NSW), the National Herbarium of Victoria (MEL), and the Queensland Herbarium (BRI). Undoubtedly more of Wild's specimens will be uncovered as herbaria progressively database their collections and make them widely available and further duplicates of the types are documented. Many of Wild's UK bryophyte specimens are accessioned with the Queensland Herbarium (BRI) indicating that he kept a personal herbarium which he brought to the colony when he emigrated. Wild's collections of bryophytes from south-east Queensland are of particular importance since many specimens were collected from areas of vineforest from the greater Brisbane area which no longer exist. For example, Wild made significant collections from scrub areas in Ashgrove, Enoggera, Newmarket, Woolston and Pimpama. His bryophyte collections from the Wet Tropics represent the first significant collection of these plants from this species rich area of the state. For reasons unknown, he collected very few bryophytes after returning from north Queensland.

Commemorations

Wild is commemorated in the names of several bryophyte and fern species, in addition to a species of butterfly, a moth, a gall midge, and a fish.

Bryophytes

Numerous bryophyte taxa have been named for Wild and in all cases his collections were used as a type where the name was validly published. All are now reduced to synonymy:

Aulacopilum wildii Broth. ex Paris, Öfvers. Förh. Finska Vetensk.-Soc. 33: 103 (1891), *nom. nud.* [= **Solmsiella solmsiellacea** (Müll. Hal. & Broth.) Pursell].

Barbula wildii Broth., Öfvers. Förh. Finska Vetensk.-Soc. 33: 97. (1890); *Didymodon wildii* (Broth.) Broth., *Nat. Pflanzenfam. I,* 3: 407 (1902). **Type:** Queensland. Darling Downs District: Highfields, December 1888, *C. Wild 21* (syn: H-BR 1292021, BM 001006605). [= **Didymodon tophaceus** (Brid.) Lisa].

Fissidens wildii Broth., Öfvers. Förh. Finska Vetensk.-Soc. 33: 94 (1891). **Type:** Queensland. Moreton District: Pimpana, August 1887, *C. Wild 2* (holo: H-BR; iso: MEL, NSW; *fide* Seppelt & Stone 2016). [= **Fissidens curvatus** Hornsch. var. **curvatus**].

Frullania wildii Steph., *Hedwigia* 33: 169 (1894). **Type:** Australia: Queensland. Darling Downs District: Toowoomba, *s.dat.*, *C. Wild 453* (lecto: G 18234; *fide* von Konrat & Braggins 2001). [= **Frullania pentapleura** Taylor].

Lejeunea wildii Steph., *Hedwigia* 28: 165 (1889), *Acrolejeunea wildii* Steph. ex Watts, *Proc. Linn. Soc. New South Wales* 26: 215 (1901); *Ptychocoleus wildii* (Steph. ex Watts) Steph., *Sp. Hepat.* 5: 60 (1912). **Type:** Queensland. Moreton District: Hamilton, July 1887, *C. Wild s.n.* (holo: G 15847; iso: BM, MANCH, NSW [H495 & H496]; *fide* Brown *et al.* 1992: 77). [= **Acrolejeunea securifolia** (Nees) Steph. & Watts].

Plagiobryum wildii Broth., Öfvers. Förh. Finska Vetensk.-Soc. 33: 101 (1891), *Bryum wildii* (Broth.) Müll.Hal., *Gen. Musc. Fr.* 204 (1900). **Type:** Queensland. Darling Downs District: Highfields, December 1888, *Wild s.n.* (holo: H-BR 0561010; iso: BM, BRI [AQ717281], MEL, NSW; *fide* Spence & Ramsay 2006). [= **Plagiobryoides cellularis** (Hook.) J.R.Spence].

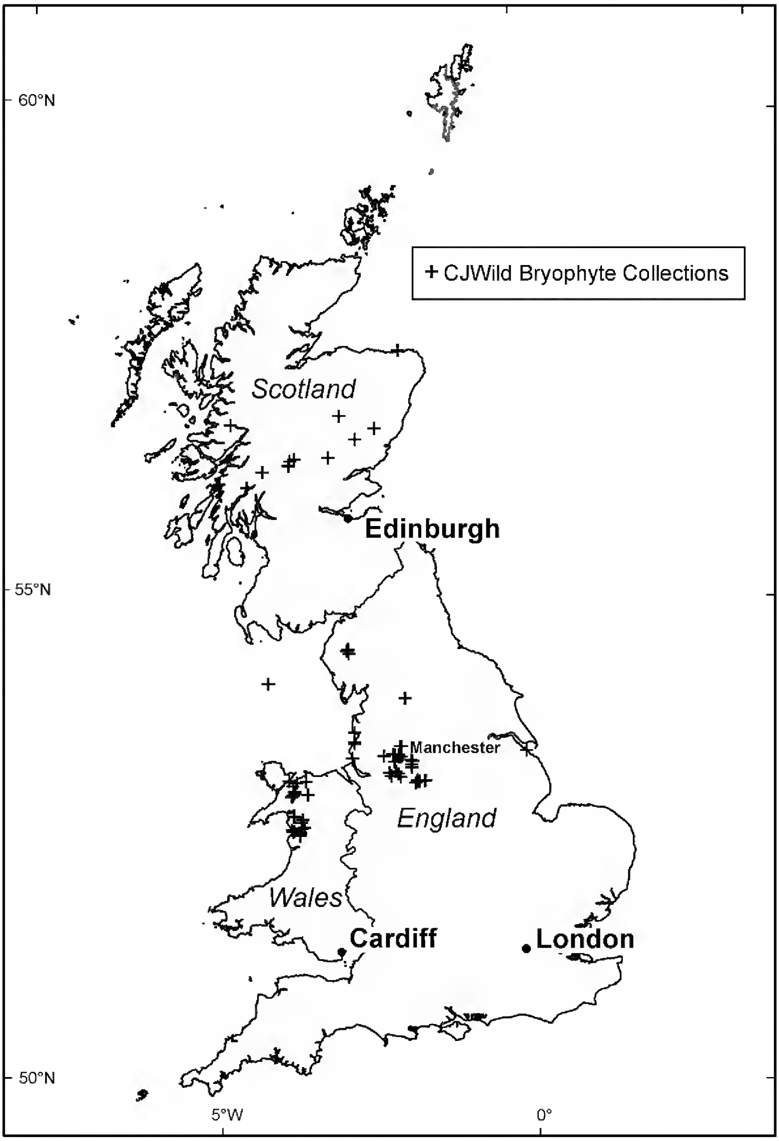

60°N
55°N
50°N
5°W
0°
+ CJWild Bryophyte Collections
Scotland
Edinburgh
Manchester
England
Wales
Cardiff
London

Fig. 4a. Distribution of bryophyte collections made by C.J.Wild from Great Britain

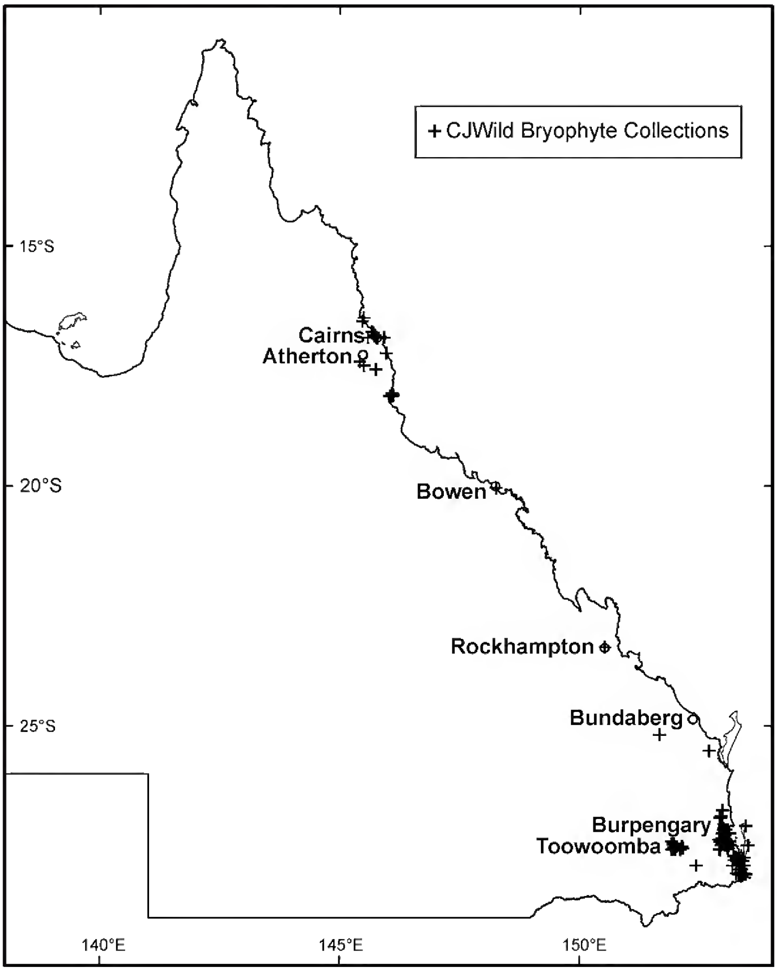

+ CJWild Bryophyte Collections
15°S
20°S
25°S
140°E
145°E
150°E
Cairns
Atherton
Bowen
Rockhampton
Bundaberg
Burpengary
Toowoomba

Fig. 4b. Distribution of bryophyte collections made by C.J.Wild from Queensland.

Wildia Müll.Hal. & Broth., Öfvers. Förh. Finska Vetensk.-Soc. 33: 103 (1891). **Type species:** *W. solmsiellaea* Müll.Hal. & Broth. ex Broth.

Wildia solmsiellaea Müll.Hal. & Broth. ex Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 33: 103 (1891). **Type:** Queensland. Moreton District: Woolston Scrub, November 1888, *C. Wild 18* (holo: H-BR 4432004; iso: P 0131494). [= **Solmsiella solmsiellacea** (Müll. Hal. & Broth.) Pursell].

Ferns

Two fern taxa have been named for Wild:

Asplenium wildii F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 4: 20 (1891). **Type:** Queensland. Cook District: Daintree River, *s.dat.*, *C. Wild s.n.* (holo: BRI [AQ144732]).

Trichomanes wildii F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 4: 19 (1891); *Crepidopteris wildii* (F.M.Bailey) N.A.Wakef., *Vict. Nat.* 66: 59 (1949); *Crepidophyllum wildii* (F.M.Bailey) C.F.Reed, *Taxon* 4: 108 (1955);

Reediella wildii (F.M.Bailey) Pic.Serm., *Webbia* 24: 719 (1970). **Type:** Queensland. Cook District: between Cairns and Herberton, in 1891, *C.J. Wild s.n.* (holo: BRI [AQ024772]; iso: NSW). [= **Crepidomanes humile** (G.Forst.) Bosch].

Fish

Rhycherus wildii Ogilby, *Proc. Roy. Soc. Queensland* 20: 18 (1907). [= **Rhycherus filamentosus** (Castelnau, 1872)].

A bony fish was "Named for Charles James Wild, Acting Curator of the Queensland Museum, by whose courtesy I am permitted to make the above description".

Butterflies and moths

Arhopala wildei Miskin, *Ann. Queensland Mus.* 1: [i]–xx 1–[93] [i]–ix (1891).

Ambulyx wildei Miskin, *Proc. Roy. Soc. Queensland* 8: 20–21 (1891).

The small oakblue butterfly and a moth respectively are also named for Wild, albeit a misspelling of his surname.

Flies and mosquitoes

Lasioptera wildi Skuse, *Proc. Linn. Soc. New South Wales* 15: 387 (1890).

A gall midge that he collected from the Brisbane Botanic Gardens.

Type specimens based on Wild collections

These cover only those that were validly published. A number of *nomina nuda* are also known, particularly for bryophytes; however, the *Wild* specimens referred to are not types.

Bryophytes

Cephalozia hirta Steph., *Sp. Hepat.* 3: 345 (1908). **Type:** Queensland. *s.dat.*, *C. Wild s.n.* (syn: G 00282621).

Fissidens arboreus Broth., Öfvers. *Förh. Finska Vetensk.-Soc.* 33: 95 (1891). **Type:** Queensland. Moreton District: Pimpama, August 1887, *C. Wild 5* (holo: H-BR?; iso: BRI, MEL, NSW 360698, NY; *fide* Stone (1990: 245). [= **Fissidens oblongifolius** var. **hyophilus** (Mitt.) Beever & I.G.Stone].

Fissidens calodictyon Broth., Öfvers. Förh. Finska Vetensk.-Soc. 33: 94 (1891). **Type:** Queensland. Moreton District: Ashgrove, May 1888, *C. Wild 1* (holo: H-BR; iso: BRI, NSW 214600). [= **Fissidens beckettii** Mitt.].

Fossombronia papillata Steph., *Hedwigia* 28: 157 (1889). **Type:** Queensland. *s.dat.*, *C. Wild s.n.* (lecto: G 00121803; isolecto: BM 79844; *fide* Stotler *et al.* 2003: 138).

Frullania seriata Gottsche ex Steph., *Hedwigia* 28: 160 (1889). **Type:** Queensland, *s.dat., C. Wild s.n.* (syn: G 00050876).

Acolea crassifolia (Carrington) Steph.; *Gymnomitrion crassifolium* Carrington, *Trans. & Proc. Botanical Soc. Edinburgh* 13: 461 (1879). **Type:** Scotland. Meal na Ptargnachan, Perthshire, August 1878, *C.J. Wild s.n.* (syn: MICH 514771).

Kurzia reversa (Carrington & Pearson) Grolle; *Lepidozia reversa* Carrington & Pearson, *J. Bot.* 27: 225 (1889). **Type:** Queensland. Moreton District: Sandy Creek, Beenleigh, May 1887, *C. Wild s.n.* (syn: G 00280616).

Macromitrium mucronulatum Müll.Hal., *Hedwigia* 37: 146 (1898). **Type:** Queensland. Moreton District: Burpengary, May 1888, *C. Wild s.n.* (holo: H-BR; iso: BM 000982643, NSW, P 0137808, P 0137809, P 0137810). [= **Macromitrium brevicaule** (Besch.) Broth.].

Wild only described one species, a hornwort.

Dendroceros subtropicus C.J.Wild, *Trans. Nat. Hist. Soc. Queensland* 1: 49 (1893). **Type:** Queensland. Moreton District: Tamborine Mountain, May 1893, *C.J. Wild s.n.* (holo: BRI [AQ722116]).

Wild (1893) did not mention a type specimen, but merely indicated that the material came from Mt Tamborine. The above cited collection is the only specimen at BRI collected at Mt Tamborine by Wild and has his original label. It had been previously identified as *Dendroceros* sp. by C. Cargill in 1994.

Other type specimens based on Wild collections include the following:

Ferns

Alsophila australis var. *excelsa* F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 2: 22 (1891). **Type:** Queensland. Cook District: between Cairns and Herberton, in 1891, *C.J. Wild s.n.* (lecto: BRI [AQ0024668], *fide* Tindale 1956: 359). [= **Cyathea cooperi** (Hook. ex F.Muell.) Domin].

Microsorum australiense (F.M.Bailey) Bostock; *Polypodium superficiale* var. *australiense* F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 4: 21 (1891). **Type:** Queensland. Cook District: between Cairns and Herberton, in 1891, *C.J. Wild s.n.* (holo: BRI [AQ0024870]).

Trichomanes nanum var. *australiense* Domin, *Biblioth. Bot.* 20: 13 (1914). **Type:** Queensland. Cook District: between Cairns and Herberton, July 1891, *C.J. Wild s.n.* (lecto: BRI [AQ0024761], *fide* Croxall 1975: 535). [= **Crepidomanes kurzii** (Bedd.) Tagawa & K.Iwats.].

Fungi

Astrosphaeriella picea (Shirley) Aptroot; *Arthopyrenia picea* Shirley, *Lich. Fl. Queensland* 4: 174 (1889). **Type:** Queensland: Moreton District: Caboolture, *s.dat.*, *C.J. Wild s.n.* (holo: BRI [AQ0721401].

Flowering Plants

Pterostylis depauperata F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 4: 18 (1891). **Type:** Queensland. Cook District: Near Cairns, in 1890, *C.J. Wild s.n.* (holo: BRI [AQ311959]).

Publications by Charles James Wild

Wild never published widely with all of his articles appearing within a six year period between 1888 and 1894 (see Wild references below).

Acknowledgements

Joyce Leech, researcher with the Manchester and Lancashire Family History Society is thanked for unearthing details of the Wild's early life and drawing my attention to specific details contained within the UK Census results. Ilona Fors of the National Library of Finland Research Library is thanked for providing scans of the letters received by Dr. V.F.Brotherus from Wild. Susan Wright, Collection Manager of Terrestrial Environments (Entomology) at the Queensland Museum assisted with my queries regarding Wild's insect collections and any insects named in his honour. Meg Lloyd, librarian of the Queensland Museum is thanked for uncovering and scanning correspondence to and from Wild during his employment with the museum. Michael Mathieson is thanked for providing constructive comments on an earlier version of this article and Sarah Xu patiently restored the scanned image of Wild (**Fig. 1**). The Director and staff of the Queensland Herbarium have been most helpful in allowing access to specimens, the specimen database and documents.

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A taxonomic revision of *Lagenophora* Cass. (Asteraceae) in Australia

Jian Wang & A.R. Bean

Summary

Wang, J. & Bean, A.R. (2019). A taxonomic revision of *Lagenophora* Cass. (Asteraceae) in Australia. ***Austrobaileya* 10(3): 405–442.** The genus *Lagenophora* Cass. is taxonomically revised for Australia with 12 species recognised from Western Australia, South Australia, Queensland, New South Wales, Australian Capital Territory, Victoria and Tasmania. Nine species are endemic to Australia and three also occur elsewhere. *Lagenophora adenosa* Jian Wang ter & A.R.Bean and *L. platysperma* Jian Wang ter & A.R.Bean are newly described; *L. gunniana* Steetz and *L. latifolia* Hook.f. are reinstated; *L. montana* Hook.f. is newly recognised for South Australia; *L. sublyrata* (Cass.) A.R.Bean & Jian Wang ter is a new combination (based on *Ixauchenus sublyratus* Cass.); and *L. gracilis* Steetz is reinstated in its original (geographically restricted) sense. All of the 12 species are fully described and seven species are illustrated. Notes are provided on the Australian distribution of all species (including maps), habitat and proposed conservation status. Identification keys are provided for Australia and for each state.

Key Words: Asteraceae; *Lagenifera*; *Lagenophora adenosa*; *Lagenophora brachyglossa*; *Lagenophora fimbriata; Lagenophora gracilis*; *Lagenophora gunniana*; *Lagenophora huegelii*; *Lagenophora latifolia*; *Lagenophora montana*; *Lagenophora platysperma*; *Lagenophora queenslandica*; *Lagenophora stipitata*; *Lagenophora sublyrata*; Australia flora; new species; identification keys; distribution maps; conservation status

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Introduction

The genus *Lagenifera* Cass. was established in 1816 by the prolific synantherologist Henri Cassini (Cassini 1816). Two years later, he used the spelling *Lagenophora* for the same genus (Cassini 1818), and the correct spelling of the genus name was for many years controversial. A proposal by Nicolson (1996) to conserve *Lagenophora* against *Lagenifera* was ultimately successful and has brought stability.

In the original publication, Cassini mentioned two species belonging to his genus (*Calendula magellanica* Willd. and *Bellis stipitata* Labill.), but he did not transfer them to *Lagenophora*. The former is now *Lagenophora nudicaulis* (Lam.) T.R.Dudley, from southern South America, and the latter is now *L. stipitata* (Labill.) Druce from southern Australia and New Zealand.

Cassini (1822) coined the name *Lagenophora billardierei* Cass., based on *Bellis stipitata*. According to the custom at that time, he combined his new genus name with a species epithet honouring the author of the name being replaced. A few years later, he (Cassini 1828) described the genus *Ixauchenus* Cass. with a single species *I. sublyratus* Cass., which he differentiated from *Lagenophora* by its many disc florets, “perhaps hermaphrodite”, the many ligulate florets arranged in two rows, the bracts of the involucre uniform throughout, and the achenes with a thick and glutinous neck. The original material for *Ixauchenus sublyratus* was for many years unknown, but recently the name has been typified (Bean & Wang 2017). The type matches a widespread Australasian species formerly included in *L. gracilis* Steetz.

De Candolle (1836) recorded four species for the genus, two from southern South America, one from New Zealand and one from

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Australia. He also recognised *Ixauchenus* as a distinct genus, and was the last botanist to do so.

Cabrera (1966) provided the most recent account of the genus as a whole; he enumerated 15 species, including three species that are now included in the allied genus *Myriactis* Less. For an excellent summary of the genera allied to *Lagenophora*, *i.e.* subtribe *Lagenophorinae* Nesom, see Hind (2004).

Phylogeny

Lagenophora is one of 9 genera belonging to the "Lagenophora group" within subtribe *Lagenophorinae* G.L.Nesom (Nesom 1998; Hind 2004), namely *Keysseria* Lauterb., *Pappochroma* Raf., *Lagenocypsela* Swenson & K.Bremer, *Lagenophora* Cass., *Myriactis* Less., *Novaguinea* D.J.Hind, *Piora* J.Kost., *Pytinicarpa* G.L.Nesom and *Solenogyne* Cass. Hind (2004) overlooked the fact that Nesom (1998) had reduced his genera *Lagenithrix* G.L.Nesom and *Lagenopappus* G.L.Nesom to synonymy with *Pappochroma* Raf.

There have been limited molecular studies dealing with the phylogeny of *Lagenophora* and its relatives. Nakamura *et al.* (2012) showed that *Solenogyne mikadoi* Koidz. from southern Japan clustered strongly with the Australian representatives of *Solenogyne*. It would be interesting to add the two species of *Lagenocypsela* from New Guinea to that analysis, as from a morphological standpoint, they would seem to be synonymous with *Solenogyne*. Nakamura *et al.* (2012) also discovered that *Lagenophora huegelii* formed part of the same clade with the species of *Solenogyne*. The study of Nakamura *et al.* (2012) suggested that *L. lanata* and *L. gracilis* are synonymous, but one of the vouchers is from Queensland, Australia, and the other from Amamioshima Island, Japan, and both could easily be *L. sublyrata*.

The latter finding was corroborated and expanded by Sancho *et al.* (2015), who identified two major clades involving *Lagenophora* and *Solenogyne*, with the Australian/New Zealand species *L. huegelii*, *L. lanata* and *L. gracilis* aligning with *Solenogyne*. The remaining "core" *Lagenophora* clade includes most of the New Zealand species, the species from southern South America, and the Australasian species *L. montana* and *L. stipitata*.

History of the Australian *Lagenophora* species

Bentham (1867) recognised four species (*Lagenophora billardierei* Cass., *L. huegelii* Benth., *L. solenogyne* F.Muell. and *L. emphysopus* Hook.f.) for Australia, but the latter two are now classified in the genus *Solenogyne* Cass. Bentham's taxonomy was followed by Davis (1950), in her revision of Australian species, resulting in the recognition of only *L. stipitata* (Labill.) Druce (syn. *L. billardierei*) and *L. huegelii* Benth. Cabrera (1966) recognised three species for Australia, *L. stipitata*, *L. huegelii* and *L. gracilis* Steetz, and established *L. gracilis* as a very widespread species, citing specimens of it from much of southern Australia, and in Malesia, south-east Asia, New Caledonia and Sri Lanka. Koster (1966) considered *L. gracilis* and *L. lanata* A.Cunn. to be synonymous, and hence she used the earlier name *L. lanata* in her study of New Guinea Asteraceae. Almost all Australian state and regional floras (Curtis 1963; Cooke 1986; Stanley & Ross 1986; Porteners & Brown 1992; Wheeler *et al.* 2002) have used only these three species names in their treatments. The exception was Clarke (1999), who reinstated *L. montana* Hook.f. for Australia, a taxon that was treated at varietal rank by Cabrera (1966). Three new species were described by Wang & Bean (2016), in their revision of the Queensland members of the genus.

In the current paper, a total of 12 species based on morphological characters are recognised for Australia. Two species (*Lagenophora adenosa* Jian Wang ter & A.R.Bean and *L. platysperma* Jian Wang ter & A.R.Bean) are newly described; *L. gunniana* Steetz and *L. latifolia* Hook.f. are reinstated; *L. montana* is newly recognised for South Australia; *L. sublyrata* (Cass.) A.R.Bean & Jian Wang ter is a new combination (based on *Ixauchenus sublyratus*); and *L. gracilis* is reinstated in its original (geographically restricted) sense. *L. montana*, *L. stipitata* and

L. sublyrata extend outside Australia, the first two to New Zealand, the last widely to mainland Asia, south-east Asia, Malesia and New Guinea.

Our morphological studies have identified two major groups within Australian *Lagenophora*. The first group (including *L. brachyglossa*, *L. fimbriata*, *L. gracilis*, *L. gunniana*, *L. huegelii*, *L. platysperma*, *L. queenslandica*, *L. sublyrata*) has bunched, rather fleshy roots and very short rhizomes, usually numerous scapes (up to 20), stems never elongating (and therefore, leaves in basal rosette). The second group (including *L. adenosa*, *L. latifolia*, *L. montana*, *L. stipitata*) has slender wiry roots, long fibrous rhizomes, often only one scape, and often with elongated stems.

Scanning electron microscopy (SEM) images of achenes have proved to be taxonomically useful in other Asteraceae groups (e.g. Zhang *et al.* 2013; Bona 2015). It transpired that it was not possible to discern unique patterns for individual Australian *Lagenophora* spp., as the within-species variation was great. However, two rather distinct patterns were noted:

Type 1 consisted of elongated cells with striate unidirectional (longitudinal) surface wax ornamentation. The species showing this pattern were *L. brachyglossa* (**Fig. 1A**), *L. gunniana, L. huegelii* (**Fig. 1B**), *L. platysperma* and *L. sublyrata*.

Type 2 consisted of oval or elliptical cells with multidirectional surface wax ornamentation. The species showing this pattern were *L. adenosa, L. fimbriata, L. gracilis* (**Fig. 1D**), *L. latifolia, L. montana, L. queenslandica* and *L. stipitata* (**Fig. 1C**).

The groupings based on SEM micrographs are not the same as those based on macro-morphology, but there is quite good correlation. For example, all the members of morphological group 2 are present in SEM Type 2. A more detailed SEM study utilising other plant parts may find further patterns or characters with taxonomic utility.

Materials and methods

This revision is based on morphological examination of *Lagenophora* material at BRI, and specimens received on loan from A, AD, AK, CANB, GH, HO, L, NSW, MEL and PERTH. Images of type specimens held at FI, G, HAL, K, M, NY, P and W have also been examined. Most measurements are based on dried material, but the dimensions of florets are based on material reconstituted with boiling water.

In this study, we took scanning electron microscope (SEM) images of the achene surface for all Australian species of *Lagenophora*, to determine whether there were patterns that would distinguish individual species. The scanning electron microscope (SEM) images were performed under the Phenom™, a high resolution desktop imaging tool with an optical camera. Achenes from between two and four vouchered specimens were used for each species.

Common abbreviations in the specimen citations are Mt (Mountain), NP (National Park), NR (Nature Reserve) and SF (State Forest). Measurements abbreviated as e.g. 1.3–2 mm infer that the feature measured varied between 1.3 and 2.0 mm.

Taxonomy

Lagenophora Cass., *Bull. Sci. Soc. Philom. Paris* 1816: 199 (Dec 1816) (*'Lagenifera'*) (*orth. cons.*). **Lectotype:** *Lagenophora billardierei* (= *L. stipitata*), *fide* A. Cunningham, *Ann. Nat. Hist.* 2(8): 126 (1839).

Small perennial herbs with stoloniferous rhizomes. Stems, leaves and scapes usually covered with eglandular hairs. The stem rudimentary or occasionally elongated (usually in the species *L. adenosa*, *L. latifolia*, *L. montana*, *L. stipitata*). Leaves rosulate or occasionally alternate on an elongated stem, obovate or oblanceolate, green, penninerved, sinuate, dentate to lobed. Scapes unbranched, usually ribbed when dry, with small or leafy bracts scattered throughout. Capitula solitary, radiate, campanulate, hemispherical to cupular, with 2–4(–6) rows of involucral bracts; the bracts herbaceous, linear-lanceolate

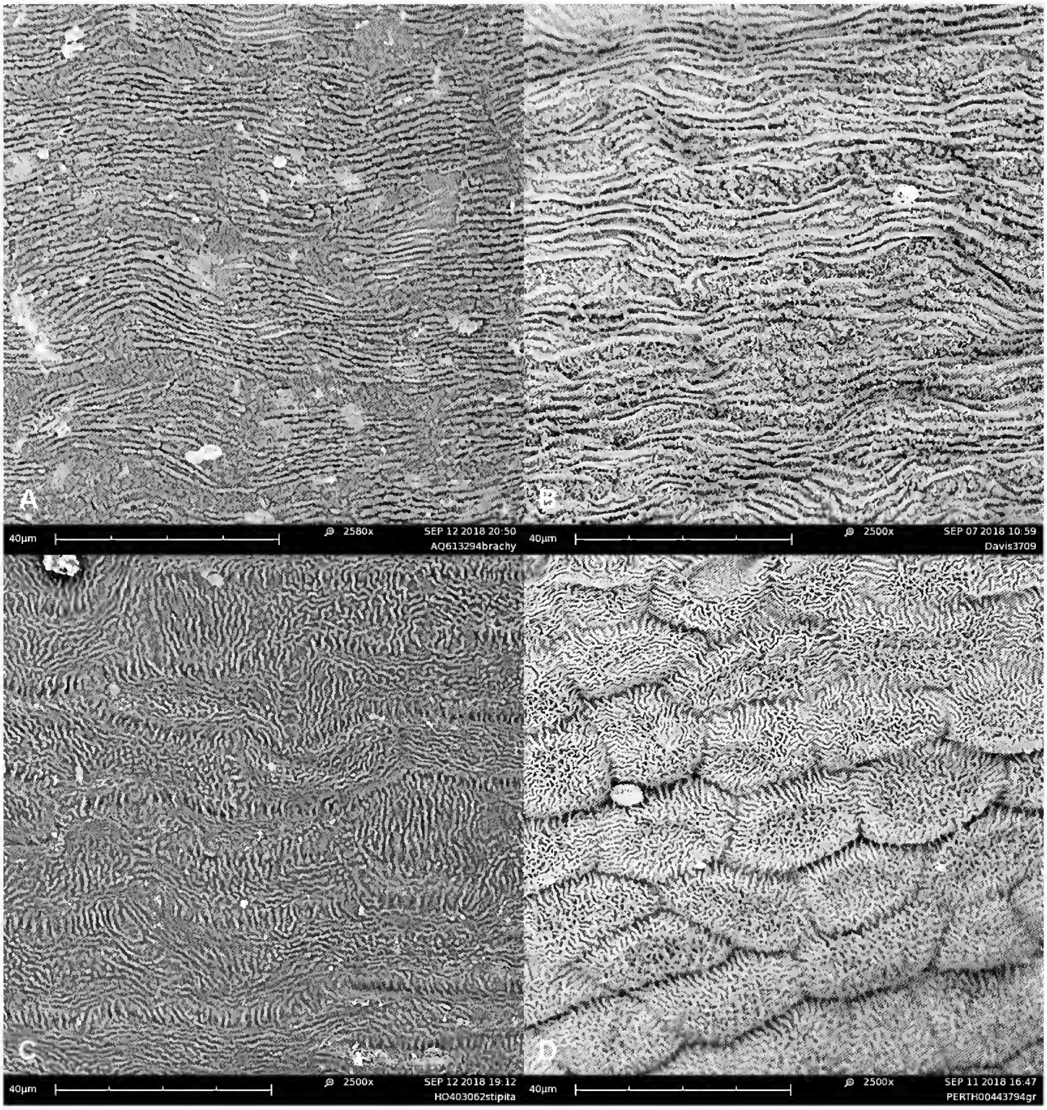
A
40µm
2580x
SEP 12 2018 20:50
AQ613294brachy
B
40µm
2500x
SEP 07 2018 10:59
Davis3709
C
40µm
2500x
SEP 12 2018 19:12
HO403062stipita
D
40µm
2500x
SEP 11 2018 16:47
PERTH00443794gr

Fig. 1. SEM micrographs of ***Lagenophora*** achene surface. A. ***L. brachyglossa*** (*Butler & Fairfax s.n.*, BRI [AQ613294]); B. ***L. huegelii*** (*Davis 3709*, PERTH); C. ***L. stipitata*** (*Moscal 12504*, HO); D. ***L. gracilis*** (*Royce 2917*, PERTH).

to oblanceolate, acute to obtuse, with narrow, scarious or fimbriate margins. Receptacle glabrous, epaleate. Ray florets in two to five rows, pistillate, ligulate, white, creamy to purple coloured; style 2-branched. Disk florets bisexual but functionally male, with a tubular corolla that is 4 or 5(–6) dentate and papillose on the outer surface. Stamens (4–)5, anthers connected, obtuse at base, filaments free. Style 2-branched; pappus absent, or (in *L. sublyrata*) 1–2 pappus scales or an annulus present on disc florets. Receptacle flat to convex, glabrous. Achenes glandular, laterally flattened, obliquely obovate to oblanceolate or lunate, usually with thickened margins, and with a short to long beak; carpopodium annular, white. Achene pappus absent.

About 25 species (Australia, New Zealand, South America, New Caledonia, China, India, Sri Lanka, Malesia, south-east Asia). 12 species in Australia.

Key to the Australian species of *Lagenophora*

1 Ligules of marginal florets up to 1 mm (0.4–1 mm) long. **2**
1. Ligules of marginal florets > 1 mm, (1–)1.4–6 mm long **4**

2 Achenes oblanceolate, 3.2–3.7 mm long excluding beak, 0.7–1.1 mm wide, light or yellowish brown, both sides tapering to the beak (**Fig. 2B**); leaves and scapes firmly attached to stem and/or rootstock . . . . **L. brachyglossa**
2. Achenes obliquely obovate, 2.8–3.4 mm long excluding beak, 1.3–1.8 mm wide, dark or reddish brown, both sides abruptly contracted into the beak (**Fig. 2E&F**); leaves and scapes usually readily detached from rootstock **3**

3 Achenes smooth on both faces and edges, scattered hairs on both faces; disc florets usually 20–30. . . . . **L. huegelii**
3. Achenes transversely wrinkled on both surfaces and edges; glabrous or with a few hairs on both faces; disc florets usually 10–15 . . . . **L. gunniana**

4 Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), glands on the dorsal edge of achene densely and continuously distributed from beak to carpopodium **5**
4. Roots tuberous and fleshy, bunched; rhizomes short; stem absent or very short (leaves in basal rosette); glands on dorsal edge of achene scattered or absent **8**

5 Scape glabrous or with a few appressed to antrorse hairs; the apex of involucral bracts obtuse . . . . **L. montana**
5. Scape hairs retrorse to patent; involucral bracts more or less subulate and finely pointed **6**

6 Leaf margins usually obtusely serrate; scape with eglandular hairs only; achene glands usually confined to dorsal edge from beak to carpopodium (**Fig. 2K**) . . . . **L. stipitata**
6. Leaf margins sinuate to undulate; scape with eglandular hairs and shorter glandular hairs; achene glands extending along ventral and dorsal edges from beak to carpopodium and often on the basal and distal portions of both faces (**Fig. 2A&G**) **7**

7 Leaves 4–5 times longer than wide, 7–15 cm long, 1–3 cm wide; achenes 3.3–4.3 mm long, 1.0–1.3 mm wide . . . . **L. adenosa**
7. Leaves 2.5–2.9 times longer than wide, 1–3.5 cm long, 0.4–1.2 cm wide; achenes 2.7–3.5 mm long, 0.7–0.9 mm wide . . . .**L. latifolia**

8 Achenes obliquely obovate, both sides abruptly contracted into the beak (**Fig. 2F&I**); achene surfaces often with scattered hairs; leaves and scapes usually readily detaching from rootstock. **9**
8. Achenes oblanceolate, one or both sides tapering to the beak (**Fig. 2C, D, J&L**); achene sufaces glabrous; leaves and scapes firmly attached to stem and/or rootstock. **10**

9 Ligules (3–)4.5–6 mm long; achenes 3.7–4.5 mm long excluding beak, 2.1–3 mm wide, achene edges not thickened . . . . **L. platysperma**
9. Ligules 0.9–1.5 mm long; achenes 2.8–3.3 mm long excluding beak, 1.3–1.7 mm wide; achene edges thickened . . . . **L. huegelii**

10 Achene glands confined to the dorsal side of beak and adjacent upper dorsal edge; achenes usually with 1–5 hairs at base . . . .**L. sublyrata**
10. Achene glands surrounding the beak, and extending sparsely along ventral and/or dorsal edges; achenes never with basal hairs **11**

11 Ligules 3–4.7 mm long; leaves glabrous except for fimbriate margins . . . . .**L. fimbriata**
11. Ligules 1.4–1.8 mm long; leaf surfaces and margins more or less equally hairy **12**

12 Leaves 2.1–3.3 times longer than wide, sessile or with a winged petiole-like base to 1 cm long; achene beak usually 0.2–0.3 mm long, without a thickened white annular collar at its apex . . . . **L. queenslandica**
12. Leaves 4–5 times longer than wide, with a winged petiole-like base 1–3 cm long; achene beak usually 0.5–0.7 mm long, with a thickened white annular collar at its apex . . . . **L. gracilis**

Key to the Western Australia species of *Lagenophora*

1 Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem); scape hairs retrorse to patent; glands on the dorsal edge of achene densely and continuously distributed from beak to carpopodium . . . . **L. stipitata**
1. Roots tuberous and fleshy, bunched; rhizomes short; stem absent or very short (leaves in basal rosette); scape hairs appressed to antrorse; glands scattered on the dorsal edge of achene **2**

2 Stem 0.5–1(–3) cm long; leaves and scapes firmly attached to stem; achenes oblanceolate, both sides tapering to the beak (**Fig. 2D**), achene faces glabrous . . . . **L. gracilis**
2. Stem less than 0.5 cm long; leaves and scapes usually readily detached from rootstock; achenes obovate, both sides abruptly contracted into the beak (**Fig. 2F&I**); achene faces usually with scattered hairs **3**

3 Ligules of marginal florets (3–)4.5–6 mm long; achenes 3.7–4.5 mm long excluding beak, 2.1–3 mm wide, achene edges not thickened . . . . **L. platysperma**
3. Ligules of marginal florets 0.9–1.5 mm long; achenes 2.8–3.3 mm long excluding beak, 1.3–1.7 mm wide; achene edges thickened . . . . **L. huegelii**

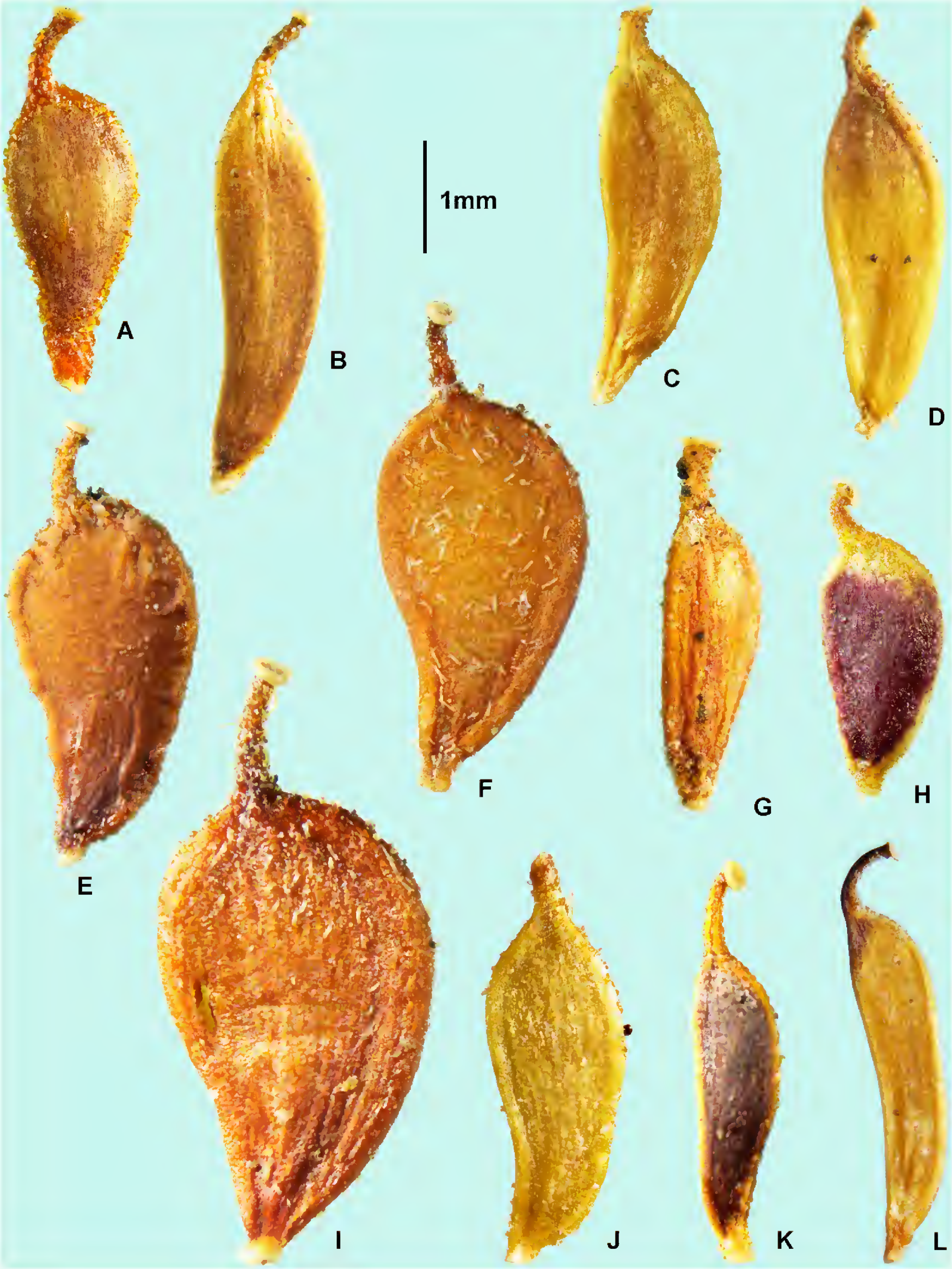

Fig. 2. Achenes of the 12 Australian ***Lagenophora*** species. A. ***L. adenosa*** (*Stajsic 812*, MEL). B. ***L. brachyglossa*** (*Butler & Fairfax s.n.*, BRI [AQ613294]). C. ***L. fimbriata*** (*Johnson 725*, BRI). D. ***L. gracilis*** (*Royce 2917*, PERTH [neotype]). E. ***L. gunniana*** (*Duncan 1035*, HO). F. ***L. huegelii*** (*Hislop 1199*, PERTH). G. ***L. latifolia*** (*Curtis s.n.*, HO 52184). H. ***L. montana*** (*Brown 185*, HO). I. ***L. platysperma*** (*Keighery 2108*, PERTH). J. ***L. queenslandica*** (*Thompson SLT2563*, BRI). K. ***L. stipitata*** (*Taylor 229*, NSW). L. ***L. sublyrata*** (*Blakely s.n.*, NSW 10275). Scale bar = 1 mm.

Key to the South Australia species of *Lagenophora*

1 Ligules of marginal florets 0.4–1 mm long; achenes transversely wrinkled on both faces and edges . . . . **L. gunniana**
1. Ligules of marginal florets 1.8–3.8 mm long; achenes smooth on both faces and edges **2**

2 Roots tuberous and fleshy, bunched; rhizomes short; stem very short (leaves in basal rosette); achene glands confined to the dorsal side of beak and adjacent upper dorsal edge; achenes usually with 1–5 hairs at base. . . . . **L. sublyrata**
2. Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), achene glands on the dorsal edge densely and continuously distributed from beak to carpopodium; achenes without basal hairs **3**

3 Scape glabrous or with a few appressed to antrorse hairs; the apex of involucral bracts obtuse. . . . . **L. montana**
3. Scape hirsute, hairs retrorse to patent; involucral bracts ± subulate and finely pointed . . . . **L. stipitata**

Key to the Queensland species of *Lagenophora*

1 Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), scape hirsute, hairs retrorse to patent; achenes dark reddish brown, glands on the dorsal edge densely and continuously distributed from beak to carpopodium . . . . **L. stipitata**
1. Roots tuberous and fleshy, bunched; rhizomes short; stem absent or very short (leaves in basal rosette); scape hairs appressed to antrorse; achenes light brown or yellowish brown, glands scattered along or absent from the dorsal edge. **2**

2 Leaves glabrous except for fimbriate margins; involucre 1.1–1.4 cm diameter with 52–62 disc florets; ligules 3–4.7 mm long . . . . **L. fimbriata**
2. Leaf surfaces and margins more or less equally hairy; involucre up to 1 cm diameter with 10–30 disc florets; ligules < 3 mm long. **3**

3 Ligules of marginal florets 0.4–0.7 mm long; achenes 3.2–3.7 mm long excluding beak . . . . **L. brachyglossa**
3. Ligules of marginal florets 1.4–2.5 mm long; achenes 2–3 mm long excluding beak **4**

4 Achene glands confined to the dorsal side of beak and adjacent upper dorsal edge; achenes usually with 1–5 hairs at base; achene usually with one to few hairs at base; achene beak 0.4–0.6 mm long, with a thickened white annular collar at its apex . . . . **L. sublyrata**
4. Achene glands surrounding the beak, and extending sporadically along ventral and dorsal edges; achenes without basal hairs; achene beak usually 0.2–0.3 mm long, without a thickened white annular collar at its apex. . . . . **L. queenslandica**

Key to the New South Wales and Australian Capital Territory species of *Lagenophora*

1 Roots tuberous and fleshy, bunched; rhizomes short; stem very short (leaves in basal rosette); achene glands confined to the beak and/or near carpopodium on both dorsal and ventral edges **2**

1. Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), achene glands on the dorsal and/or ventral edges densely and continuously distributed from beak to carpopodium **3**

2 Ligules of marginal florets 0.4–0.7 mm long; achene glands confined to the beak and near carpopodium on both dorsal and ventral edges; achene without basal hairs . . . . **L. brachyglossa**

2. Ligules of marginal florets 1.5–2.5 mm long; achene glands confined to the dorsal side of beak and/or adjacent margin of body; achene usually with 1–5 basal hairs . . . . **L. sublyrata**

3 Scape glabrous or with a few appressed to antrorse hairs; the apex of involucral bracts obtuse . . . . **L. montana**

3. Scape hairs retrorse to patent; involucral bracts more or less subulate and finely pointed **4**

4 Leaf margins usually obtusely serrate; scape with eglandular hairs only; achene glands usually confined to dorsal edge from beak to carpopodium (**Fig. 2K**) . . . . **L. stipitata**

4. Leaf margins sinuate to undulate; scape with eglandular hairs and shorter glandular hairs; achene glands extending all along ventral and dorsal edges from beak to carpopodium and often on the basal and distal portions of both faces (**Fig. 2A**). . . . . **L. adenosa**

Key to the Victoria species of *Lagenophora*

1 Ligules of marginal florets up to 1 mm (0.4–1 mm) long. **2**

1. Ligules of marginal florets more than 1 mm (1.8–3.8 mm) long **3**

2 Achenes oblanceolate, smooth on both faces and edges, light or yellowish brown; achene glands confined to the beak and near carpopodium on both dorsal and ventral edges; leaves and scapes firmly attached to stem and/or rootstock . . . . **L. brachyglossa**

2. Achenes obliquely obovate, transversely wrinkled on both faces and edges, dark reddish brown; achene glands on the dorsal edge densely and continuously distributed from beak to carpopodium; leaves and scapes usually readily detached from rootstock . . . . **L. gunniana**

3 Roots tuberous and fleshy, bunched; rhizomes short; stem absent or very short (leaves in basal rosette); achene glands confined to the beak and adjacent upper dorsal edge; achenes usually with 1–5 hairs at base . . . . **L. sublyrata**

3. Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), achene glands on the dorsal edge densely and continuously distributed from beak to carpopodium; achenes without basal hairs **4**

4 Scape glabrous or with a few appressed to antrorse hairs; the apex of involucral bracts obtuse. . . . . **L. montana**
4. Scape hairs retrorse to patent; involucral bracts more or less subulate and finely pointed **5**

5 Leaf margins usually obtusely serrate; scape with eglandular hairs only; achene glands usually confined to dorsal edge from beak to carpopodium (**Fig. 2K**) . . . . **L. stipitata**
5. Leaf margins sinuate to undulate; scape with eglandular hairs and shorter glandular hairs; achene glands extend all along ventral and dorsal edges from beak to carpopodium and often on the basal and distal portions of both faces (**Fig. 2A**). . . . . **L. adenosa**

Key to the Tasmania species of *Lagenophora*

1 Ligule of marginal florets up to 1 mm (0.5–1 mm) long; achene faces usually transversely wrinkled . . . .**L. gunniana**
1. Ligule of marginal florets more than 1 mm (1.8–3.8 mm) long; achene faces smooth. **2**

2 Roots tuberous and fleshy, bunched; rhizomes short; stem absent or very short (leaves in basal rosette); achene glands confined to the beak and adjacent upper dorsal edge; achene usually with 1–5 basal hairs . . . .**L. sublyrata**
2. Roots fibrous and wiry, not bunched, rhizomes spreading; stem short or often elongated (leaves alternate along stem), achene glands on the dorsal edge densely and continuously distributed from beak to carpopodium; achene without basal hairs **3**

3 Scape glabrous or with a few appressed to antrorse hairs; the apex of involucral bracts obtuse. . . . . **L. montana**
3. Scape hairs retrorse to patent; involucral bracts more or less subulate and finely pointed **4**

4 Leaf margins usually obtusely serrate; scape with eglandular hairs only; achene glands usually confined to dorsal edge from beak to carpopodium (**Fig. 2K**) . . . . **L. stipitata**
4. Leaf margins sinuate to undulate; scape with eglandular hairs and shorter glandular hairs; achene glands extend all along ventral and dorsal edges from beak to carpopodium and often on the basal and distal portions of both faces (**Fig. 2G**) . . . .**L. latifolia**

1. Lagenophora adenosa Jian Wang ter & A.R.Bean, **sp. nov.** with affinity to *L. stipitata*, but differing by the larger leaf size, the crenate or waved leaf margins, two types of scape indumentum and different distributional pattern of glands on the achenes. **Typus:** Victoria. Snowfields District: Lake Mountain, Woollybutt Track, February 1993, *V. Stajsic 812* (holo: MEL 2020538; iso: MEL 2160257).

Perennial rhizomatous herb; roots and rhizomes fibrous; stem short (leaves in basal rosette) or often elongated (leaves alternate along stem); leaves and scapes firmly attached to stem and/or rootstock. Leaves 5–16(–20), obovate to spathulate, (4–)7–15 cm long, 1–3 cm wide (4–5× longer than wide), sessile with a winged petiole-like base to 4 cm long; leaf apex obtuse; leaf margins sinuate to undulate, usually with 11–15 shallow lobes, each lobe 1–3 mm long; upper leaf surface green; lower leaf surface pale green; both surfaces with eglandular hairs 0.3–1 mm long, 4–12 per mm^2, and sessile glands; leaf margins with 8–15 eglandular hairs per mm^2, each 0.4–0.8 mm long; lateral veins obvious on dried material on both surfaces. Scapes channelled, 1–3(–5) per tuft, each 10–23 cm long at anthesis, 15–26 cm long at fruiting stage, *c.* 1 mm diameter but expanding to *c.* 2.5 mm at apex; indumentum including broad-based eglandular hairs 0.4–0.6 mm long, patent or retrorse, 3–6 hairs per mm^2 at midpoint of scape, 6–8 hairs per mm^2 towards apex, narrow eglandular hairs 0.1–0.3 mm long, appressed, patent or retrorse and shorter glandular hairs to *c.* 0.01 mm long, all hair types with similar densities; bracts 1–4, upper ones *c.* 5 × 0.5 mm, lower ones *c.* 20 × 1 mm or occasionally even larger. Capitula (5–)6–7 mm long, (11–)12–15(–17) mm diameter; involucral bracts 47–60 in 5–6 rows, linear, narrow-lanceolate, glabrous except for hairs along midrib on outer surface, apex acute to acuminate, with fringed margins on distal half; outer bracts *c.* 3 × 0.4 mm, inner bracts 3–4 × 0.4–0.7 mm. Receptacle convex, 3–5.2 mm diameter and 1.5–2.6 mm high. Ray florets *c.* 88, in 4–6 rows; tube 0.6–1 mm long, 0.2–0.3 mm wide, glandular hairy; style branches 0.3–0.5 mm long; ligules 3–3.4 × 0.4–0.6 mm with 3–4 longitudinal veins, mauve to blue, apex obtuse and usually 2-lobed. Disc florets *c.* 18; corolla tubular, 2–2.5 mm, mauve, outer surface with short glandular hairs, lobes (4–)5, deltate, 0.6–0.7 × 0.4–0.5 mm; stamens 5, *c.* 0.6 mm long; style branches *c.* 0.4 mm long; sterile ovary 1.8–2 mm long, with a thickened white annular collar at its apex, collar 0.25–0.4 mm diameter. Achenes oblanceolate, straight or slightly curved, 2.8–3.3 mm long excluding beak, 1–1.3 mm wide, mostly uniformly brown at maturity; edges not thickened; glands extending all along ventral and dorsal edges from beak to carpopodium, and on the basal and distal portions of both faces, otherwise glabrous; beak 0.5–1 mm long, densely surrounded by glands, and with a white annular collar at its apex, 0.2–0.25 mm diameter. **Fig. 3.**

***Additional selected specimens examined*: New South Wales.** Southern Tablelands District: Bimberi Peak, Queanbeyan, Jan 1912, *Cambage 3422* (NSW); The Peaks, Yarrangobilly, Jan 1933, *de Beuzeville s.n.* (NSW 10304); Near summit of Mt Lowden, Tallaganda SF, Dec 1973, *Hoogland 12445* (NSW). **Australian Capital Territory.** Mt Bimberi, Dec 1930, *Burges s.n.* (NSW 15850); Bendora to Mt Franklin, Jan 1958, *Burbidge MG4456* (CANB). **Victoria.** Far SW of Mt Buffalo Plateau, between The Horn & Wilfred's Hill, Feb 1963, *Willis s.n.* (MEL 2161250); *c.* 2 miles [3.3 km] SW of Mt Wellington on the Tali Karng track, Gippsland, Jan 1964, *Muir 3105* (MEL); Baw Baw Ski Village, Beech Trail, Dec 2005, *Stajsic 3757* (MEL); Lake Hill, SW of Nunniong Plains, Jan 1971, *Beauglehole 36332 & Finck* (MEL); Nunniong Plateau, Dripping Hut Track, N of Reedy Track, Feb 1973, *Beauglehole 41432* (MEL); Nunniong Plateau, no Name Flat area, Feb 1973, *Beauglehole 41442* (MEL); Nunniong Plateau, Jam Tin Flat, Feb 1973, *Beauglehole 41473* (MEL); 1.6 km E of Mt Phipps, 17.7 km SW of Omeo. Extreme upper reaches of Livingstone Creek, Mar 1975, *Beauglehole 41702* (MEL); Mt Donna Buang, Mar 1979, *Morton s.n.* (MEL 1513241); Mt Stirling, eastern slopes near The Monument, Jan 1982, *Corrick 7987* (MEL); Mt Buffalo NP, *c.* 250 m N of retaining wall of Reservoir, Jan 1982, *Short 1397* (MEL); Cambarville, Mar 1985, *Earl s.n.* (MEL 672053); Wabonga Plateau State Park, E of Buckland Spur Track, Jan 1988, *Beauglehole 93124* (MEL); Eskdale Spur, Mt Bogong, Feb 1992, *Craven 2175 & Craven* (MEL); *c.* 8.5 km S by E of Buxton, Blue Range Road at crossing of Storm Creek, Feb 1993, *Clarke 2263* (MEL); On Black Range Track, *c.* 3 km W of Stephens Spur Track, Mar 1994, *Kemp s.n.* (MEL 2025758); S of Harrietville, on track to Mt Sugarloaf, 1 km from the Alpine Road, Apr 1994, *Gutter s.n.* (MEL 2025755).

***Distribution and habitat*:** *Lagenophora adenosa* is endemic to Victoria and the southern area of New South Wales where it is restricted to high altitudes above 1,000 m (**Map 1**). It usually grows in montane damp forest, wet sclerophyll forest, tall eucalypt forest, alpine meadow and low heathland and open woodland. There is also a record from *Leptospermum grandifolium* Sm. thicket.

***Phenology*:** Flowers mostly from November to March and fruits from January to April.

***Affinities*:** *Lagenophora adenosa* is of similar appearance to the parapatric *L. stipitata*, but differs by the larger leaf size usually 7–15 cm long (1.5–7.7 cm long for *L. stipitata*), the crenate or waved leaf margins (obtusely serrate for *L. stipitata*), the two types of scape indumentum (usually one type only for *L. stipitata*) and different gland distributional pattern on the achenes.

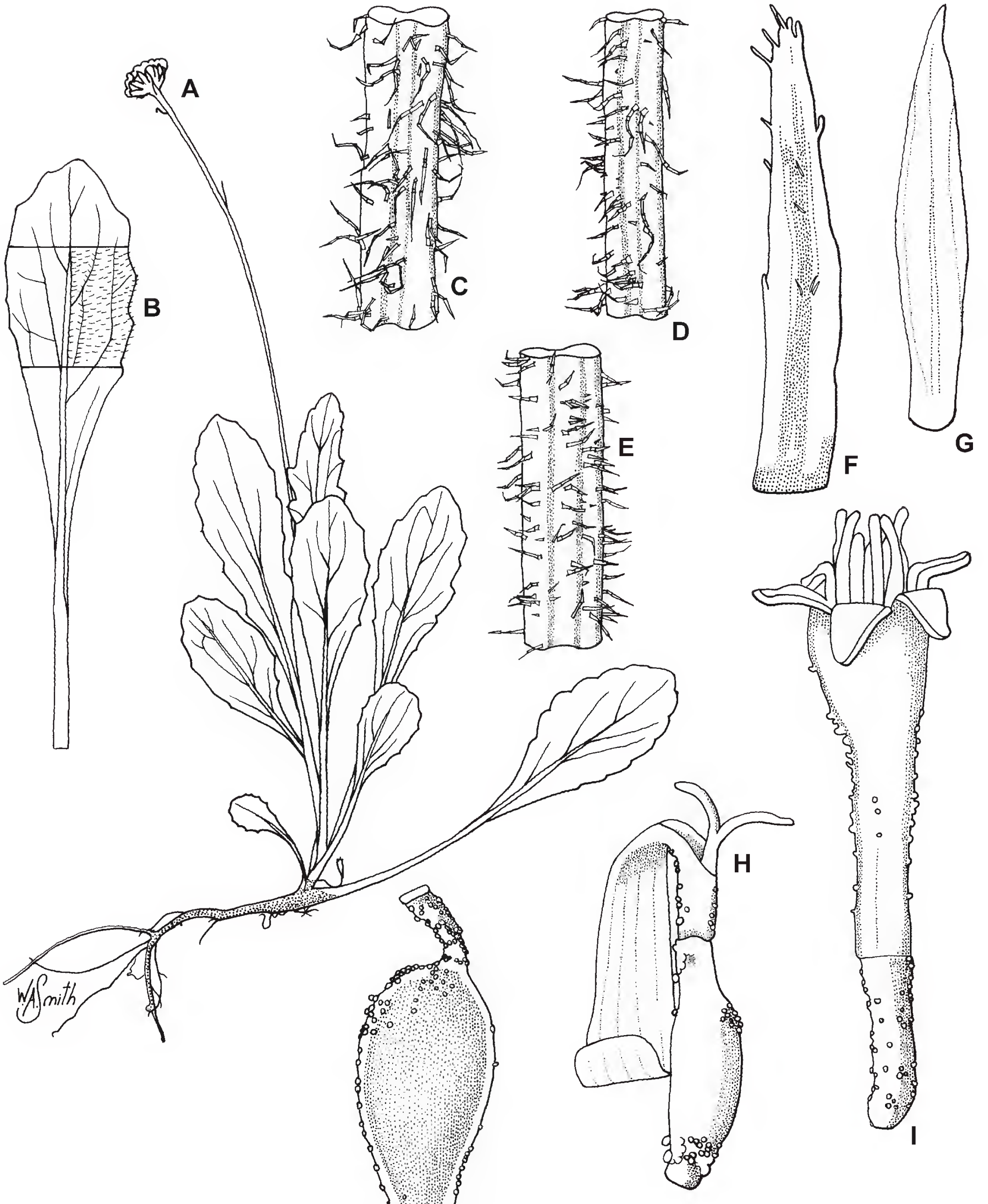

Fig. 3. ***Lagenophora adenosa.*** A. habit of whole plant with flowering inflorescences ×0.6. B. leaf with a section showing indumentum detail ×1. C–E. lower, mid and upper-sections of scape ×8. F. outer involucral bract ×16. G. inner involucral bract ×16. H. marginal floret ×16. I. disc floret ×16. J. achene ×16. A–I from *Stajsic 3757* (MEL); J from *Stajsic 812* (MEL [holotype]). Del. W. Smith.

***Conservation status*:** *Lagenophora adenosa* is a common species where it was recorded in Victoria, it is unlikely to be rare in southern NSW and is not considered to be threatened. A **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

***Etymology*:** From the Latin *adenosus*, meaning 'glandular'. This refers to the dense glands or glandular hairs on the scapes and leaf surfaces of this species.

2. Lagenophora brachyglossa Jian Wang ter & A.R.Bean, *Austrobaileya* 9: 475 (2016). **Type:** Queensland. Moreton District: 3.2 km along Duck Creek Road, near Lamington National Park, 29 February 2016, *A.R. Bean 32729 & J. Wang* (holo: BRI; iso: NSW).

***Illustrations*:** Wang & Bean (2016: 476, 477).

Perennial rhizomatous herb; roots fleshy, bunched, 0.6–1.6 mm diameter; no stem or stem extremely short to 5 mm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves 6–9, oblanceolate to obovate, 3–10 cm long, 0.9–2.5 cm wide (3.3–4× longer than wide), sessile or with a winged petiole-like base to 2 cm long; leaf apex obtuse; leaf margins crenate to sinuate, with 13–21 teeth, each tooth 0.5–1.5 mm long; upper leaf surface grey-green, lower leaf surface pale green; both surfaces with eglandular hairs 0.2–0.3 mm long and 3–7 per mm^2; leaf margins with 10–15 eglandular hairs per mm^2, each 0.2–0.3 mm long; lateral veins obscure on dried material. Scapes slightly channelled, 2–6 per tuft, each 10–16 cm long at anthesis, 9–30 cm long at fruiting stage, *c.* 0.6 mm diameter; indumentum eglandular, 0.1–0.3 mm long, antrorse, more or less appressed, 4–8 hairs per mm^2 at midpoint of scape, rather more dense towards apex; bracts 3–5, upper ones *c.* 2 × 0.1 mm, lower ones *c.* 18 × 3 mm. Capitula 4–6 mm long, 6–10 mm diameter; involucral bracts 20–40 in 3–4 rows, oblanceolate, glabrous, apex obtuse, margin with short hairs on distal part; outer bracts 1–1.8 × 0.5–0.7 mm, inner bracts 2.2–3 × 0.5–0.7 mm. Receptacle slightly convex, *c.* 2.3 mm diameter and *c.* 0.9 mm high. Ray florets 35–45 in 2–4 rows; tube 0.2–0.3 mm long, *c.* 0.2 mm diameter, minutely hairy; style branches 0.2–0.4 mm long; ligule 0.4–0.7 mm long, *c.* 0.2 mm wide, bright pink to purple, apex obtuse. Disc florets 15–20, corolla tubular, *c.* 1.6 mm long, light yellow, outer surface with a few minute hairs, lobes 5, deltate, *c.* 0.3 mm long; sterile ovary 0.9–1 mm long. Achenes obliquely oblanceolate, straight or slightly curved, 3.2–3.7 mm long excluding beak, 0.7–1.1 mm wide, light brown to brown at maturity; edges not thickened; glands sparsely distributed at the base on both ventral and dorsal edges, otherwise glabrous; beak 0.6–0.8 mm long, densely surrounded by glands, and with a white annular collar at its apex, *c.* 0.2 mm diameter.

***Additional selected specimens examined*:** **Queensland.** Burnett District: Fig Tree Gully, Bunya Mountains, Jun 2003, *Butler & Fairfax s.n.* (BRI [AQ613294]). Darling Downs District: 7 km WNW of Clifton, Feb 1995, *Fensham 1997* (BRI); 23 km SSE of Toowoomba, Feb 1995, *Fensham 2073* (BRI); Allora Mt, Allora, Nov 2005, *Flesser s.n.* (BRI [AQ724458]); 16 km NNE of Stanthorpe, Mar 2010, *Thompson 252B & Brennan* (BRI). Maranoa District: Saddler Springs, at spring 5.3 km NNW of homestead, Carnarvon Range, Jan 2010, *Eddie 1791 & Hancock* (BRI). Moreton District: 3.6 km along Duck Creek road, near O'Reillys guest house, Mar 2001, *Bean 17391B* (BRI). **New South Wales.** Central Coast District: Kentlyn Road, Campbelltown, Mar 1962, *McBarron 6947* (NSW); Sportsground, Appin, Feb 1967, *McBarron 13928* (NSW). Central Western Slopes District: Hoffman Property, near Muswellbrook, May 2003, *James & Corkish s.n.* (NSW 721138). North West Slopes District: Oxley Park, Tamworth, Nov 1985, *Hosking s.n.* (NSW 563235); *ibid*, Nov 1985, *Hosking s.n.* (NSW 563552). South Western Slopes District: Tarcutta Hills (Bush Heritage's site), Aug 2004, *Burrows s.n.* (NSW 723815). **Victoria.** Devils Backbone, W of Snowy River, Mar 1971, *Beauglehole 37267* (MEL).

***Distribution and habitat*:** *Lagenophora brachyglossa* is endemic to eastern Australia and is a relatively widespread species occurring in Victoria, New South Wales and Queensland. In Queensland, it extends from near Stanthorpe and the Lamington Plateau, north-west to Carnarvon Range, mainly in the higher altitude and higher rainfall areas (**Map 2**). It usually grows on basaltic clay soils in open forests and woodland dominated by *Eucalyptus crebra* F.Muell., *E. biturbinata* L.A.S.Johnson & K.D.Hill, *E. caliginosa* Blakely & McKie, *E. eugenioides* Sieber ex Spreng., *E. laevopinea* R.T.Baker, *E. microcorys* F.Muell., *E. moluccana* Roxb., *E. orgadophila* Maiden & Blakely, *E.*

tereticornis Sm. and *Angophora floribunda* (Sm.) Sweet with grassy understorey.

***Phenology*:** Flowers are recorded from November to March and fruits from January to June.

***Affinities*:** *Lagenophora brachyglossa* is of similar appearance to the parapatric *L. sublyrata*, but differs by the very short ligules 0.4–0.7 mm long (1.8–3 mm long for *L. sublyrata*), the longer achene 3.2–3.7 mm long excluding beak (versus 2.4–2.8(–3.3) mm long excluding beak for *L. sublyrata*), the glands surrounding the beak and on achene base of both ventral and dorsal edges (the glands confined to dorsal side of beak and adjacent area of achene for *L. sublyrata*). *L. brachyglossa* also lacks hairs at the base of the achene (usually 1–5 hairs at base for *L. sublyrata*).

***Conservation status*:** *Lagenophora brachyglossa* has a large distributional range from Victoria to southern Queensland. Although it is usually not a common species where it was recorded, it does occur in national parks. Therefore, a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

3. Lagenophora fimbriata Jian Wang ter & A.R.Bean, *Austrobaileya* 9 : 472 (2016). **Type:** Queensland. Moreton District: Purga Nature Reserve, 14 km SSW of Ipswich, 1 December 2015, *A.R. Bean 32442 & J. Wang* (holo: BRI; iso: BM, CANB, CHR, MEL, NSW, P, US).

***Illustrations and photo*:** Wang & Bean (2016: 473, 474).

Perennial rhizomatous herb; roots fleshy, bunched, 1–2 mm diameter; no stem or short stem to *c.* 5 mm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves 5–16, oblanceolate, 4–15 cm long, 0.8–2.7 cm wide (5–5.6× longer than wide), sessile or with a winged petiole-like base to 4 cm long; leaf apex obtuse; leaf margins finely toothed, with 9–23 teeth, each tooth 0.2–1 mm long; upper leaf surface dark green, lower leaf surface pale green; both surfaces usually glabrous; leaf margins with 3–4 eglandular hairs per mm^2, each *c.* 0.3 mm long; lateral veins often obscure on dried material on both surfaces. Scapes channelled, (1–)3–7 per tuft, each 10–20 cm long at anthesis, 14–38 cm long at fruiting stage, 0.6–1.2 mm diameter; indumentum 0.05–0.1 mm long, antrorse, more or less appressed, 2–5 hairs per mm^2, very sparse at midpoint of scape, rather denser towards apex; bracts 3–7, 10–18 mm long and 0.5–2 mm wide. Capitula 6–10 mm long, 11–14 mm diameter; involucral bracts 24–28 in 2–3 rows, oblong to obovate, glabrous, apex obtuse, with fringed margin on distal part, outer bracts 1.6–2.1 × 0.6–0.7 mm, inner bracts 2.5–3.5 × 0.7–1 mm. Receptacle convex, *c.* 2 mm diameter and *c.* 1 mm high. Ray florets 40–50, in 2 rows; tube *c.* 1 mm long and 0.3 mm diameter with minute hairs; style branches *c.* 0.5 mm long; ligule 3–4.7 × 0.5–1.1 mm, white to mauve, apex obtuse. Disc florets (46–)52–62; corolla tubular, 2.7–3.2 mm long, light yellow, outer surface with minute hairs; corolla lobes 5, deltate, 0.4–0.5 × 0.3–0.4 mm; stamens 5, *c.* 2.5 mm long (anthers *c.* 1.2 mm long, filaments *c.* 1.3 mm long); style branches 0.6–1 mm long; sterile ovary 1–1.5 mm long; pappus scales absent. Disc florets (46–)52–62; corolla tubular, 2–2.8 mm long, light yellow, outer surface with minute hairs, lobes 5, deltate, 0.3–0.4 mm long; sterile ovary 1–1.5 mm long. Achenes obliquely oblanceolate, 2.8–3.2 mm long excluding beak, 0.8–1 mm wide, light brown to brown at maturity; edges slightly thickened; glands mostly confined to dorsal edge, the density gradually reducing from apex to base, otherwise glabrous; beak (0.2–)0.4–0.5(–0.7) mm long, densely glandular on dorsal side, sparsely glandular elsewhere, with a white annular collar at its apex, 0.2–0.3 mm diameter.

***Additional selected specimens examined*:** **Queensland**. Burnett District: Auburn Ranges, *c.* 6.2 km N of Dawson Vale East, along road to Rockybar, Mar 1997, *Pollock 450 & Baumgartner* (BRI); Borania SF, S of the Eidsvold – Theodore Road, Apr 2015, *Forster PIF42379 & Thomas* (BRI). Darling Downs District: Inglewood, Mar 1911, *Boorman s.n.* (NSW 10281); *c.* 10 miles [16.6 km] S of The Gums, Mar 1959, *Johnson 725* (BRI); Calala, *c.* 10 miles [16 km] E of Meandarra, Jun 1960, *Johnson 1612* (BRI); Burraburri Creek, 16 km W of Durong, May 1992, *Forster PIF9858* (BRI, DNA, MEL). Moreton District: Jimboomba, May 1921, *Cheel s.n.* (NSW 10280); Near Willowbank raceway, SW of Ipswich, Apr 1990, *Bean 1526* (BRI); Champion Way, 1 km N of Cunningham Highway, *c.* 12 km SW of Ipswich, Apr 1991, *Sharp 5039 & Bird* (BRI); 1.4 km along Champion's Way from Cunningham Highway, Willowbank, *c.* 12 km SW of Ipswich, Jan 1993, *Jobson 1872 & Albrecht* (MEL).

Distribution and habitat: *Lagenophora fimbriata* is endemic to south-east Queensland, extending from near Cracow to Inglewood, and east to Jimboomba (**Map 1**). It inhabits heavy clay soils in flat or gently undulating terrain, in communities dominated by *Acacia harpophylla* F.Muell. ex Benth. (brigalow) and *Casuarina cristata* Miq. (belah), or *Eucalyptus moluccana* and/or *Melaleuca irbyana* R.T.Baker.

Phenology: Flowers mostly from November to April and fruits mainly from March to May. Mass flowering event also recorded in July 2016.

Affinities: *Lagenophora fimbriata* is of similar appearance to the parapatric *L. sublyrata*, but differs by the glabrous leaf surfaces, the fimbriate hairs on leaf margin, the larger capitula 11–14 mm diameter (usually to 2.5–11 cm long for *L. sublyrata*), the larger ligules 3–4.7 × 0.5–1.1 mm (1.8–3 × 0.15–0.35 mm for *L. sublyrata*), disc florets 46–62 (10–30 in *L. sublyrata*), and the glands on the achene distributed along dorsal edge from beak to near base (versus confined to dorsal side of beak and adjacent area of achene for *L. sublyrata*).

Conservation status: Although *Lagenophora fimbriata* has a restricted distributional range in south-east Queensland, it can be locally abundant where it occurs. A species survey by us found that on a 4-hectare property at Jimboomba, the population size varied from 120 to 190 plants per 100 square metres, with a total of 5,000–6,000 plants estimated. To date, there are only 5 locations where the species was recorded in the last 30 years (**Map 2**). There is evidence that due to urban development and habitat destruction, the species' occupancy area has declined in the past decade. Therefore, a **Vulnerable** conservation status is recommended based on the IUCN (2012) criteria.

4. Lagenophora gracilis Steetz, *Pl. Preiss. [J.G.C.Lehmann]* 1(3): 431 (1845). **Type citation:** Western Australia, *L. Preiss s.n.*; King George Sound, *J.S. Roe s.n.* **Type:** Western Australia. Darradup, 16 miles [26 km] W of Nannup, 21 October 1948, *R.D. Royce 2917* (neo: PERTH 00443794 [here designated]; isoneo: PERTH 00444014).

Perennial rhizomatous herb; roots fleshy, bunched, 1–4 mm diameter; stem 0.5–1(–3) cm long; leaves and scapes firmly attached to stem. Leaves (5–)10–16, obovate, oblanceolate, spathulate, 4–10(–13) cm long, 1–2(–3) cm wide (4–5× longer than wide), with a winged petiole-like base 1–3 cm long; leaf apex obtuse, rounded; leaf margins sinuate to repand, usually with 7–13 teeth, each 0.5–2.5 mm long; upper leaf surface slightly dark green, glabrous or with 1 eglandular hairs per mm^2, each 0.3–0.6 mm long; lower leaf surface pale green, glabrous or with 1–2 hairs per mm^2, each 0.4–0.7(–1.0) mm; leaf margins with 5–20 hairs per mm^2, each 0.2–0.6 mm long; lateral veins often obscure on dried material on both surfaces. Scapes channelled, 2–14 per tuft, each 2–11 cm long at anthesis, 8–21 cm long at fruiting stage, 0.4–1 mm diameter from lowest section to upmost section; indumentum 0.1–0.6 mm long, antrorse, more or less appressed, scattered throughout, glabrous or very sparse at midpoint of scape (2–5 hairs per mm^2), gradually denser towards apex; bracts 3–7, upper ones *c.* 2 × 0.5 mm, lower ones *c.* 10 × 1.5 mm or occasionally even larger. Capitula 3–4.5 mm long, 7–9 mm diameter; involucral bracts 30–40 in 3–5 rows, lanceolate, glabrous or minute hairs on lower mid part of outer surface, apex acuminate to obtuse, fringed and purple coloured, outer bracts *c.* 2 × 0.5 mm, inner bracts *c.* 3 × 0.7 mm. Receptacle convex, 1.2–1.7 mm diameter and 0.6–1 mm high. Ray florets *c.* 60, in 2 rows; tube *c.* 0.5 mm long, 0.1–0.15 mm wide, glandular hairy; style branches *c.* 0.3 mm long; ligule 1.4–1.6 × 0.3–0.4 mm with 2–3(–4) longitudinal veins, mauve, apex obtuse. Disc florets *c.* 25; corolla tubular, *c.* 1.8 mm, light green, outer surface with short glandular hairs, lobes 5, deltate, *c.* 0.3 × 0.15 mm long and with purple tips; stamens 5, *c.* 0.7 mm long; style branches *c.* 0.5 mm long; sterile ovary *c.* 1 mm long; no pappus scales between corolla and sterile ovary. Achenes oblanceolate, usually straight, 2.7–3 mm long excluding beak, 0.7–0.8 mm wide, purplish brown at maturity; edges slightly thickened; glands scattered along dorsal edge from top to base and beak (not dense at all), otherwise glabrous; beak (0.3–) 0.5–0.7 mm long, surrounded by glands, and with a white annular collar at its apex, *c.* 0.2 mm diameter. **Fig. 4.**

***Additional specimens examined*: Western Australia.** Lowden, Aug 1909, *Koch 1924* (PERTH); Pemberton, Nov 1921, *Koch 2584* (PERTH); West Cape Howe, W of Albany, Mar 1956, *Royce 5393* (PERTH); King Creek, West of Mt Manypeaks, May 1964, *George 6285* (PERTH); Porongurup, corner Porongurup and Surrey Downs Road, 1990, *Burchell 34* (PERTH); Walpole – Nornalup NP, the Gap track, SW from Peaceful Bay, Sep 1992, *Wheeler 3186B* (PERTH); Crampton NR, 23 km N of Bunbury, Nov 1994, *Keighery 13547* (PERTH); 30 m N of bridge over Rosa Brook, 3000 m E of Sues Road on Denny Road, Jan 1997, *Casson B12.5 & Evans* (PERTH); 40 m E of road, Bevan Road, 5.7 km E of Watershed Road, Feb 1997, *Godden W113.7 & Casson* (PERTH); 5 km along Wagelup Road from intersection with Carter Road, Feb 1997, *Day MJ14.3 & Annels* (PERTH); Hartwood Road, Oct 1998, *Davis 8085B* (PERTH); Ten Mile Brook, Bramley NP, S of Margaret River, Nov 2007, *Keighery 1116 & Keighery* (PERTH).

***Distribution and habitat*:** *Lagenophora gracilis* is endemic to south-western Western Australia, extending from Gin Gin (just north of Perth) to Manypeaks, near Albany (**Map 3**). It grows mostly in eucalypt and/or melaleuca open woodlands. It also recorded in tall shrubland on floodplain and heathland on peaty sand and/or loam.

***Phenology*:** Flowering has been recorded from January, February, March, May, August, September, and November. Fruiting mainly in October and November, also in March, May and September.

***Typification*:** Type material was sought from C, DBN, E, G, H, HBG, K, L, LD, LE, OXF, MEL, P, M and MEL, but no relevant specimens could be located. This has necessitated the designation of a neotype for the name.

***Affinities*:** *Lagenophora gracilis* is of similar appearance to *L. huegelii* and *L. sublyrata*. It differs from *L. huegelii* by the more or less glabrous leaf surface (hairy for *L. huegelii*), the sinuate to repand leaf margins (lacerate or incised for *L. huegelii*), the glabrous achenes (few to many hairs for *L. huegelii*). It differs from *L. sublyrata* by the absence of pappus scales on the disc florets, the glands scattered along dorsal edge from top to base and on beak (versus dorsal side of the beak and adjacent margin only for *L. sublyrata*), and the absence of basal hairs of the achenes (usually 1–5 hairs present for *L. sublyrata*).

***Conservation status*:** Although *Lagenophora gracilis* has a restricted distributional range in south Western Australia, it can be locally abundant where it occurs. The species is not considered to be threatened and a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

5. Lagenophora gunniana Steetz, *Pl. Preiss. [J.G.C.Lehmann]* 1(3): 431 (1845). **Type:** Tasmania. in 1844, *R. Gunn 510* (lecto: K 000890132, *fide* Cabrera 1966: 295).

Perennial rhizomatous herb; roots fleshy, bunched, 1–5 mm diameter; stem usually absent; leaves and scapes usually readily detached from rootstock. Leaves (3–)5–9 (–17), ovate, obovate to spathulate, 1–6(–10.5) cm long, 0.5–1.5(2.5) cm wide (2.1–4.1× longer than wide); leaf base slightly winged petiolate-like 0.5–2(–4) cm long; leaf apex obtuse or rounded, leaf margins dentate, crenate, pinnatilobate, with 11–21 teeth, each tooth 1–3 mm long; upper leaf surface slightly dark green, with 3–10 eglandular hairs per mm^2, each 0.5–1 mm long; lower leaf surface pale green, with 3–15 eglandular hairs per mm^2, each 0.4–1 mm; leaf margins with 8–20 eglandular hairs per mm^2, each 0.4–1 mm long; lateral veins obscure on dried material on both surfaces. Scapes more or less channelled, 1–5 per tuft, each 3–16 cm long at anthesis, 6–30 cm long at fruiting stage, 0.4–1.2 mm diameter from lowest section to upmost section; indumentum 0.3–0.7 mm long, upright, antrorse, retrorse and appressed, 3–6 hairs per mm^2 at midpoint of scape, gradually denser towards apex; bracts 3–6, upper ones 2–4 × 0.5–1 mm, lower ones 4–20 × 1–4 mm or occasionally even larger. Capitula 4–7 mm long, 7–12

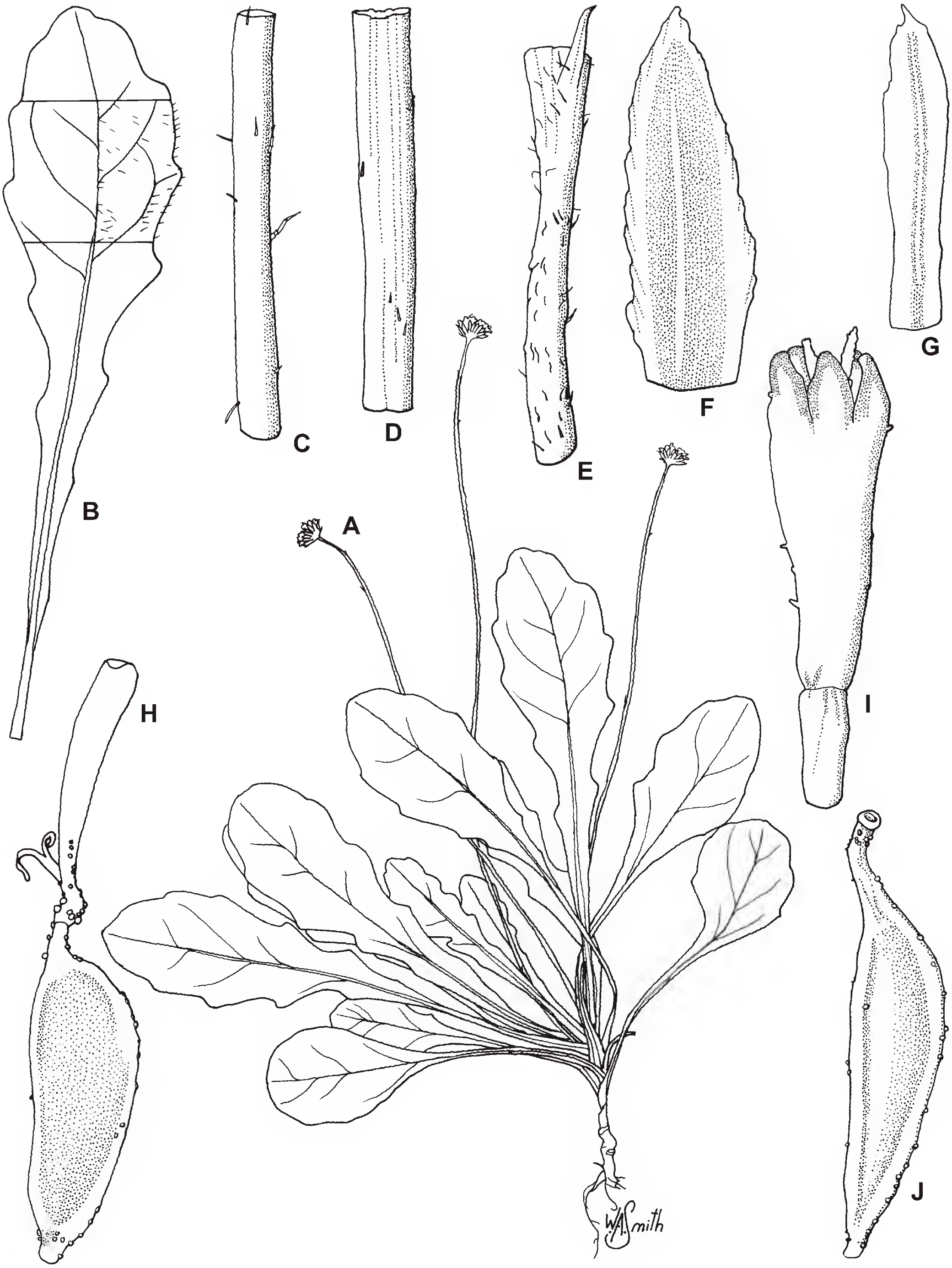

Fig. 4. ***Lagenophora gracilis***. A. habit of whole plant with flowering and fruiting inflorescences ×1. B. leaf with a section showing indumentum detail ×1.5. C–E. lower, mid and upper-sections of scape ×12. F. outer involucral bract ×24. G. inner involucral bract ×24. H. marginal floret ×24. I. disc floret ×24. J. achene ×16. A–E from *Keighery 13547* (PERTH); F–I from *Keighery & Keighery 1116* (PERTH); J from *Royce 2917* (PERTH [neotype]). Del. W. Smith.

mm diameter; involucral bracts 24(–30) in 2–4 rows, lanceolate to narrow lanceolate, glabrous or minute hairs on mid part of outer surface, apex acute, margin mainly on the top half fringed and purple coloured; outer bracts *c.* 2.2 × 0.4 mm; inner bracts *c.* 3 × 1 mm. Receptacle near convex, 1.8–3 mm diameter and 0.7–1.7 mm high. Ray florets 41(–50), in 4–6 rows; tube *c.* 0.4 mm long and 0.2 mm wide, glandular hairy; style branches 0.3–0.5 mm long; ligules 0.5–1 × 0.2–0.4 mm with 2–4 longitudinal obscure veins, mauve, light yellow, creamy, apex obtuse. Disc florets 10(–15); corolla tubular, 1.4–1.8 mm, mauve, outer surface with scattered glandular hairs, lobes 4 or 5, deltate, *c.* 0.5 × 0.5 mm long, and with purple tips; stamens 5, *c.* 1.1 mm long (anthers *c.* 0.6 mm long, filaments c. 0.5 mm long); style branches *c.* 0.5 mm long; sterile ovary *c.* 1 mm long; pappus scales present as a rim between corolla tube and sterile ovary. Achenes obliquely obovate with lower part unequal, 2.9–3.4 × 1.4–1.8 mm excluding beak, dark purplish brown at maturity; edges thickened; surfaces usually transversely wrinkled, glabrous or with a few hairs *c.* 0.1 mm long; glands evenly scattered along dorsal edge and densely covered ventral edges; beak 0.6–1 mm long, densely surrounded by glands, and with a white annular collar at its apex, *c.* 0.2 mm diameter. **Fig. 5.**

***Additional selected specimens examined*: South Australia.** South East District: 25 miles [40 km[E of Meningie, *c.* 110 km SE of Adelaide, on Lake Albert, Oct 1960, *Sharrad 923* (AD); Big Heath Reserve, near Keith, Nov 1965, *Hunt 2587* (AD). Northern Lofty District: Webb Gap, 8 km E of Waterloo, Oct 1981, *McAlister 204* (AD). Southern Lofty District: Sturt Gorge Recreation Park, Hundred of Noarlunga, Section 1665, Oct 2001, *Blaylock 3069* (AD). Kangaroo Island District: American River Cannery walking trail, Sep 2012, *Overton & Overton 3119* (AD). York Peninsula District: Stansbury on a N/S track, *c.* 1 mile [1.6 km] S of the Minlaton – Stansbury Road, Oct 1970, *Barber 835* (AD). Eyre Peninsula District: 3.4 km direct ESE of the Fountain, Sep 2004, *Lang & Canty BS128–3380* (AD). Flinders Ranges District: 6.2 km direct WNW of Melrose, Hd. Wongyarra, Oct 1992, *Canty & Heard BS49–767* (AD). Murray District: Kaiser Stuhl Conservation Park, off Tanunda Creek Road, Sep 1990, *Taplin 405* (AD). **Victoria**. Yarra [River], Oct 1852, *Mueller s.n.* (MEL 2160540); Moyston, Oct 1872, *Sullivan 45* (MEL 2160551); Shire of Dimboola, Oct 1897, *Reader s.n.* (MEL 2160554); Strathbogie Ranges, in the Euroa district. On the Strathbogie road 3.5 miles [5.8 km] from Merton, Oct 1960, *Muir 1439* (MEL); Little Desert, 5 km E of Broughtons Waterhole, 25 km SE of Kaniva Post Office, Nov 1979, *Beauglehole 66337* (MEL); Meredith at Garema, at the end of Pioneer Ridge Road in the hill near the cliff, Sep 1985, *Lebreton 48* (MEL); Drumanure, beside Nine Mile Creek on S side and *c.* 100 m W of Gordon's Road. 8 km SE of Numurkah, Nov 1991, *Thompson 72* (MEL). **Tasmania.** Sandy Bay, Nov 1894, *Rodway 351* (HO); Queens Domain, Hobart, Oct 1949, *Curtis s.n.* (HO 13457); Sandy Bay, old rifle range, now site of University, Sep 1951, *Curtis s.n.* (HO 13458); Tinderbox, S of Hobart, Oct 1975, *Ratkowsky s.n.* (HO 14996); Meehan Range, near Tunnel Hill, May 1985, *Duncan 1035* (HO); SE ridge of Knopwood Hill, Nov 1984, *Buchanan 3894* (HO); Wimmera River, 3km S of Dimboola, Sep 1990, *Collier 4789* (HO); Diprose Lagoon, Cleveland, Oct 1998, *Duncan s.n.* (HO 443339).

***Distribution and habitat*:** *Lagenophora gunniana* is endemic to Tasmania, including Bass Strait islands, and south-eastern mainland Australia where it is distributed in Victoria and South Australia (**Map 2**). It grows mostly in eucalypt woodlands and open forests on a variety of soil conditions such as heavy grey clay, sandy loam. It is distributed from near sea level to above 1,000 m.

***Phenology*:** Flowers mostly recorded in September-October and fruits mainly from September to November. There are collections showing both flowering and fruiting in May.

***Typification*:** Gunn collected this species from several locations on various dates, but consistently used the number "510" for all of these. Cabrera (1966) specified a collection made in 1844, and there is only one specimen at K with this year on the label.

***Affinities*:** *Lagenophora gunniana* is of similar appearance to *L. huegelii* and *L. platysperma*, but differs by the disc florets 10(–15) (20–50 florets for both *L. huegelii* and *L. platysperma*), and the transversely wrinkled achenes on both faces and edges (smooth achenes for both *L. huegelii* and *L. platysperma*).

***Conservation status*:** Although *Lagenophora gunniana* is occasional and rare at a number of sites where it has been recorded, it can also be abundant and common from some sites. The species is not considered to be threatened and a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

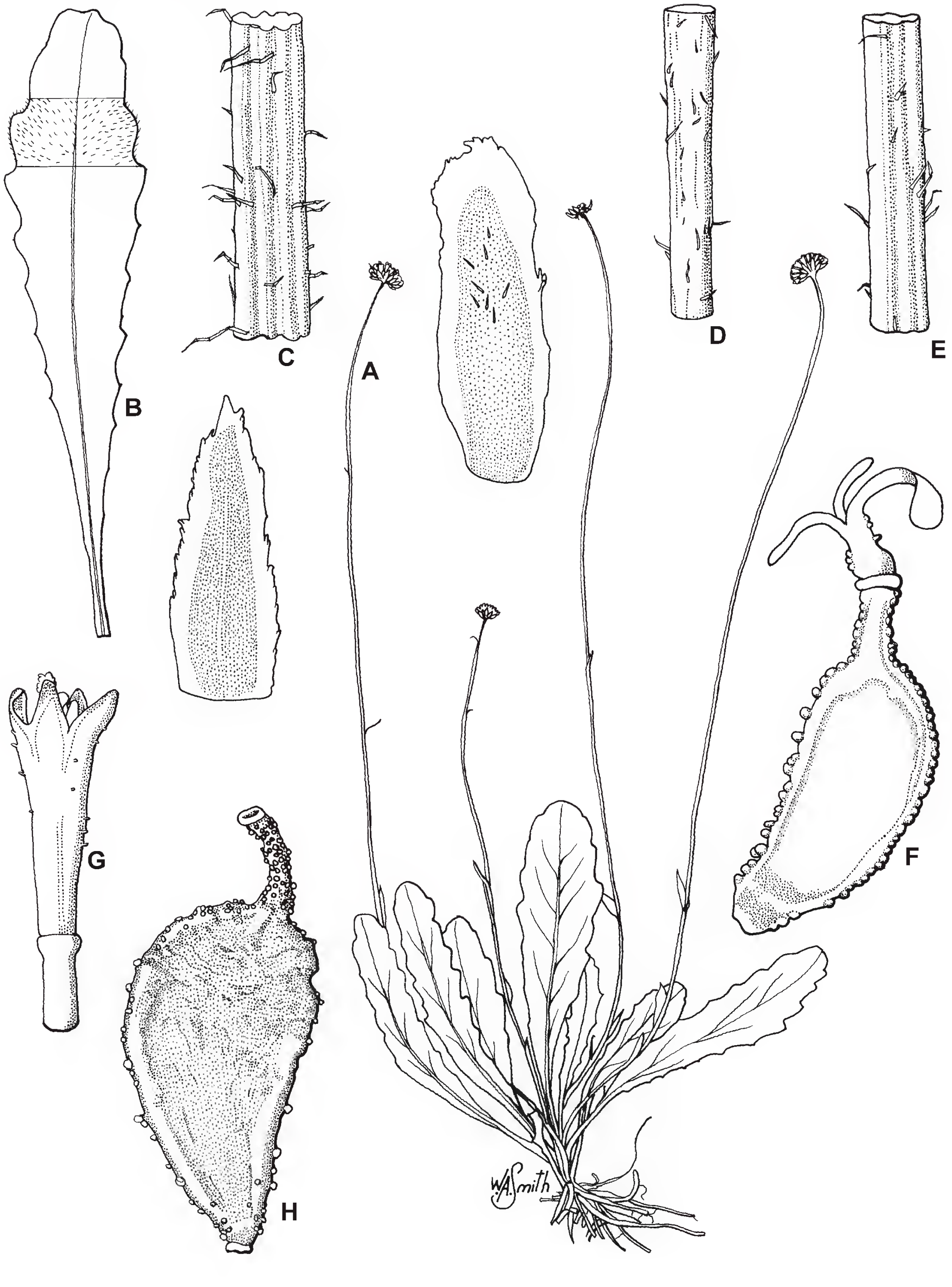

Fig. 5. ***Lagenophora gunniana.*** A. habit of whole plant with flowering and fruiting inflorescences ×0.5. B. leaf with a section showing indumentum detail ×1. C–E. lower, mid and upper-sections of scape ×8. F. inner involucral bract ×16. G. outer involucral bract ×16. H. marginal floret ×24. I. disc floret ×16. J. achene ×16. All from *Buchanan 3894* (HO). Del. W. Smith.

6. Lagenophora huegelii Benth., *Enum. Pl. [Endlicher]* 59 (1837). **Type:** Western Australia. King George's Sound, *s.dat.*, *C.A.A. Hügel s.n.* (lecto: W 0047214 [here designated]).

Perennial rhizomatous herb; roots fleshy, bunched, 0.7–4(–7) mm diameter; stem absent; leaves and scapes usually readily detached from rootstock. Leaves 4–10(–15), ovate, obovate to spathulate, 3.5–11 cm long, 1.6–3 cm wide (2.2–3.7× longer than wide), sessile with a slightly winged petiolate-like base to 6 cm long; leaf apex obtuse or rounded; leaf margins crenate or sinuate, usually with 13–23 shallow lobes, each lobe (0.5–)1–3(–4) mm long; upper leaf surface slightly dark green, with (2–)4–7 eglandular hairs per mm^2, each (0.3–)0.5–0.9 mm long; lower leaf surface pale green, with 4–8 eglandular hairs per mm^2, each 0.3–0.9 mm; leaf margins with 8–15 eglandular hairs per mm^2, and each 0.4–1.2 mm long; lateral veins obscure on dried material on both surfaces. Scapes more or less channelled, 1–6 per tuft, each 7–16 cm long at anthesis, 13–35 cm long at fruiting stage, 0.4–0.8 mm diameter from lowest section to upmost section; indumentum 0.2–0.7 mm long, upright and retrorse, 3–6 hairs per mm^2 at midpoint of scape, gradually more dense towards apex, much denser on the top and near the involucre; bracts 3–8, upper ones *c.* 4 × 1 mm, lower ones *c.* 20 × 4 mm or occasionally even larger. Capitula 4–6 mm long, 8–11 mm diameter; involucral bracts 24–46 in 2–6 rows, lanceolate to narrow lanceolate, usually more or less hairy especially on mid part of outer surface, apex acute, margin mainly on the top half fringed and purple coloured; outer bracts 2–3 × 0.4–1 mm, inner bracts 3–3.5 × 0.9–1.1 mm. Receptacle convex, 3–4 mm diameter and 1–2 mm high. Ray florets 40–60, in 4–6 rows, tube 0.3–0.5 mm long, *c.* 0.3 mm wide, glandular hairy; style branches 0.4–0.5 mm long; ligules 0.9–1.5 × 0.2–0.4 mm with 2–4 longitudinal obscure veins, mauve, light yellow, creamy; apex obtuse. Disc florets 20–30, corolla tubular, *c.* 3 mm long, mauve, outer surface with scattered gland, lobes 4(–5), deltate, *c.* 0.5 × 0.5 mm, and with purple tips; stamens 4(–5), *c.* 1.3 mm long (anthers *c.* 0.8 mm long, filament *c.* 0.5 mm long); style branches 0.4–0.6 mm long; sterile ovary 0.5–1 mm long; no or rarely 1 appendage 0.4–0.5 mm long between corolla and sterile ovary. Achenes obliquely obovate or obovate with lower part unequal, 2.8–3.3 × 1.3–1.7 mm excluding beak, dark purplish brown at maturity; surfaces with scattered hairs 0.1–0.2 mm long; edges thickened; glands sparsely distributed along both dorsal (densely) and ventral (sparsely) edges; beak 0.5–0.8 mm long, densely surrounded by glands, and with a white annular collar at its apex, *c.* 0.2 mm diameter. **Fig. 6.**

***Additional selected specimens examined*: Western Australia.** Acton Park, Busselton district, Sep 1951, *Royce 3812* (PERTH); Near Mt Gordon, S of Bremer Bay, Oct 1965, *George 6940* (PERTH); 1 km W of Great Northern Highway along Hay Flat Road, 26 km N of South Bindoon, Sep 1983, *Cranfield 4215* (PERTH); Misery Beach, Torndirrup NP, 20 km S of Albany, Nov 1986, *Keighery 8523* (PERTH); 'Sandy Bay', Nornalup Inlet, Nov 1986, *Wilson 12415* (PERTH); 13 km S of Witchcliffe, Sep 1992, *Annels 2506* (PERTH); Kennys Tank Reserve, Frankland Road, off Highway 1, S of Frankland, Oct 1993, *Croxford 7124* (PERTH); Valley Bush, 28 km WSW of Kojonup, Oct 1997, *Lewis 285* (PERTH); Capercup North Road, opposite Capercup NR, Oct 1998, *Davis 8663* (PERTH); 7.5 km SW of Mt Dale, Jul 1997, *Davis 3709* (Perth); Tom Road just N of Donnelly River Crossing, close to Tom Road campsite, SW of Wheatley; Nov 1998, *Hislop 1199* (PERTH); Wickepin Shire Reserve on the corner of 86 Gate Road and Rich Road, 30 km ENE of the town of Wickepin, Oct 1999, *Gunness et al. 23273342* (PERTH); W side of Benaring Road, *c.* 10 km ENE of Calingiri, Sep 2000, *Davis WW 6–9* (PERTH); Loaring Lane, 5 km W of Margaret River, Oct 2000, *Scott 231* (PERTH); North Boundary Road, 1 km N of Kingston Road, Winnejup Forest Block, Oct 2001, *Cranfield & Ward s.n.* (PERTH 06027571); NE of eastern end of Oakover Road, S of York, Sep 2004, *Hislop et al. WW 144–39* (PERTH); S of Milton Road, opposite Quarbabing Hill, E of Pingelly, Sep 2006, *Hislop et al. WW 183–16* (PERTH); Foxes Lair, Walk track entry off Felspar Street, Oct 2007, *Sawkins & Rose 454* (PERTH); off W end of Pike Road, W of Brookton, Sep 2008, *Hislop & Griffiths WW 233–32* (PERTH); S of Pike Road and E of Strange Road, W of Brookton, Sep 2008 *Hislop & Griffiths WW 234–10* (PERTH); W of Moorumbine Road opposite the intersection with Gillett Road, NE of Pingelly, Oct 2008, *Hislop & Griffiths WW 238–8* (PERTH).

***Distribution and habitat*:** *Lagenophora huegelii* is endemic to south-west Western Australia where it is distributed as far north as Geraldton and east to Cape Arid (**Map 4**). It grows in low and tall eucalypt open forests and woodlands including Jarrah/Marri

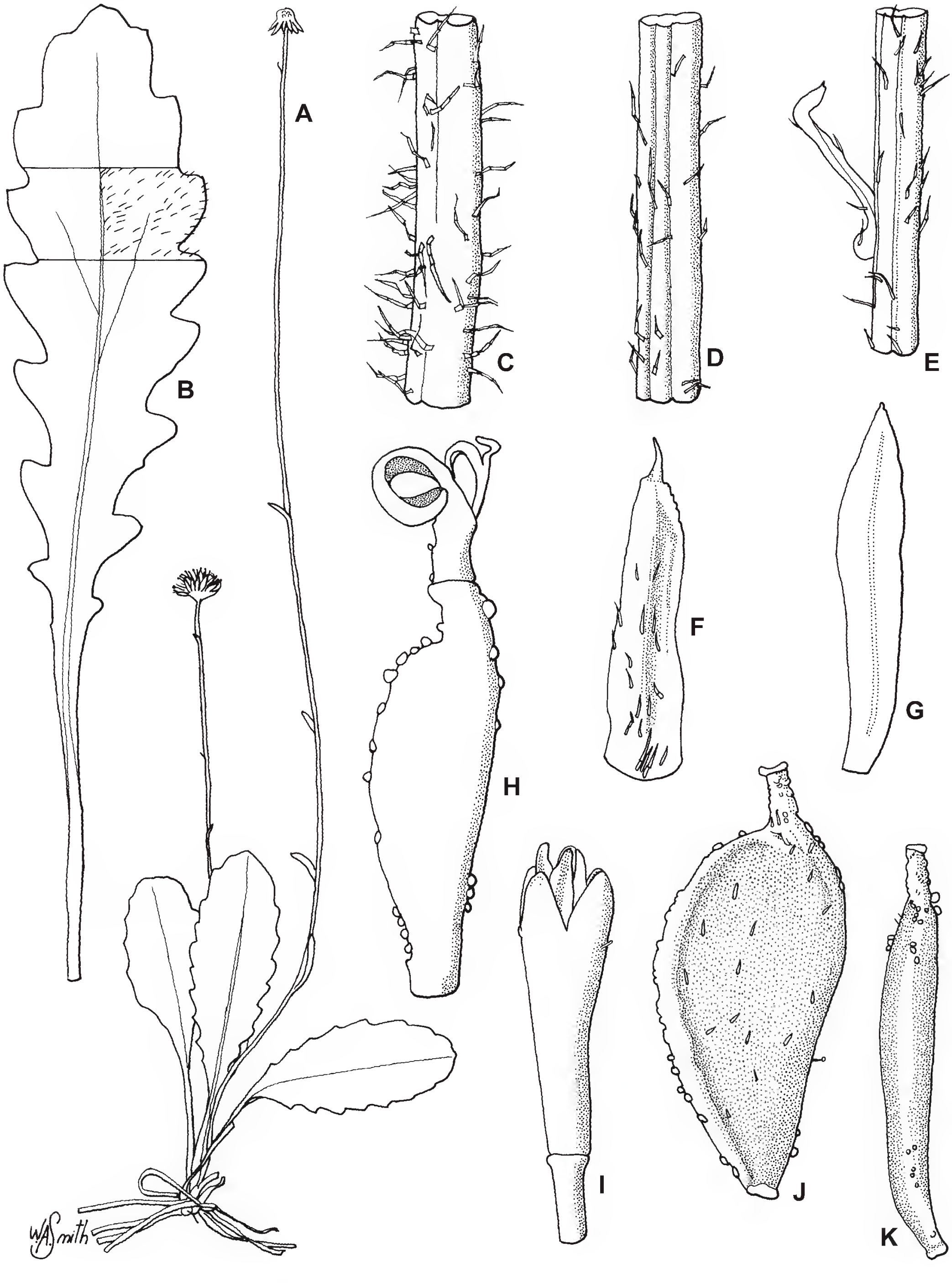

Fig. 6. ***Lagenophora huegelii.*** A. habit of whole plant with fruiting inflorescences ×0.8. B. leaf with a section showing indumentum detail ×1.5. C–E. lower, mid and upper-sections of scape ×8. F. outer involucral bract ×16. G. inner involucral bract ×16. H. marginal floret ×24. I. disc floret ×16. J. achene ×16. K. side view of an achene × 16. A, C–E from *Davis 8663* (PERTH); B & F–K from *Hislop et al. WW144-39* (PERTH). Del. W. Smith.

forest and Jarrah woodland. It also grows in heathland and very open shrubland with sedges and other herb species in the ground layer. The soils usually are grey sandy clay, brown clayey sand, brown dark loam and loamy sand.

***Phenology*:** Flowers recorded from as early as July and August, but mostly from September to October, rarely in December. Fruits usually from September to December.

***Typification*:** We consider that one of the two specimens cited in the protologue, from Swan River (W 0047213), represents *L. gracilis*. The protologue of *L. huegelii* describes the achenes, and only W 0047214 possesses achenes. Hence this specimen is the better choice for the lectotype, and it preserves the current usage of the name.

***Affinities*:** *Lagenophora huegelii* is of similar appearance to *L. gunniana* and *L. platysperma*. It differs from *L. gunniana* by the 20–30 disc florets (10(–15) disc florets for *L. gunniana*) and smooth achenes (achenes transversely wrinkled on both surfaces and on edges for *L. gunniana*). It differs from *L. platysperma* by the shorter and narrower ligules, usually 0.9–1.2(–3) mm long and 0.2–0.4 mm wide (versus 4.5–6 mm long, 0.8–1.2 mm wide for *L. platysperma*), and the achenes 3.3–4.5 × 1.3–1.7 mm (4.8–5.1 × 2.1–3 mm for *L. platysperma*).

***Conservation status*:** *Lagenophora huegelii* has relatively wide spread distributional range in south-west Western Australia. It is usually a frequent species and can be locally abundant where it occurs. The species is not considered to be threatened and a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

7. Lagenophora latifolia Hook.f., *London J. Bot.* 6: 113 (1847); *L. stipitata* var. *latifolia* (Hook.f.) Domin, *Biblioth. Bot.* 89: 653 (1930). **Type:** Tasmania. Mt Wellington, 1 March 1839, *R. Gunn s.n.* (lecto: K 000890125 [here chosen]; isolecto: NSW 10305).

Perennial rhizomatous herb; roots and rhizomes fibrous; stem very short (leaves in basal rosette) or sometimes elongated (leaves alternate along stem); leaves and scapes firmly attached to stem and/or rootstock. Leaves 5–9, ovate, obovate or spathulate, (0.5–)1–3.5 cm long, 0.4–1.2 cm wide (2.5–2.9× longer than wide), sessile with a winged petiole-like base to 1 cm long; leaf apex obtuse; leaf margins sinuate or waved, usually with 7–11 shallow lobes, each lobe 1–2 mm long; upper leaf surface dark green, with 4–8 eglandular hairs per mm^2, each 0.4–1 mm long; lower leaf surface pale green, with 4–10 eglandular hairs per mm^2, each 0.3–1 mm long; leaf margins with 8–12 eglandular hairs per mm^2, each 0.3–0.6 mm long; lateral veins obvious on dried material on both surfaces. Scapes channelled, 1–3(–5) per tuft, each 2–9 cm long at anthesis, 3–12 cm long at fruiting stage, 0.5–1(–1.5) mm diameter from lowest section to upmost section; indumentum including broad-based eglandular hairs 0.4–0.6 mm long, patent or retrorse, 10–15 hairs per mm^2 at midpoint of scape, 12–20 hairs per mm^2 towards apex, narrow eglandular hairs 0.1–0.3 mm long, appressed, patent or retrorse and shorter glandular hairs to *c.* 0.01 mm long, all hair types with similar densities; bracts 1–3, upper ones *c.* 2.5 × 0.5 mm, lower ones *c.* 12 × 1 mm or occasionally even larger. Capitula 4–5 mm long, 7–11 mm diameter; involucral bracts *c.* 46 in 4–5 rows, linear, narrow lanceolate, glabrous except for hairs along midrib on outer surface, apex acute to acuminate, with fringed margins usually on top half distal part; outer bracts *c.* 2.3 × 0.4 mm, inner bracts *c.* 3.5 × 0.5 mm. Receptacle convex, *c.* 2.4 mm diameter and 1.3 mm long. Ray florets *c.* 70, in 3 rows, tube 0.4–0.5 mm long, *c.* 0.2 mm wide, glandular hairy; style branches 0.4–0.5 mm long; ligules 1.5–2 × 0.2–0.4 mm with 2–3 longitudinal veins, mauve, apex obtuse or 2-splited. Disc florets *c.* 17; corolla tubular, 1.7–2.5 mm, mauve, outer surface covered with short glandular hairs, lobes 5 or 6, deltate, *c.* 0.5 × 0.4 mm in size; stamens 5, 0.8–1 mm long; style branches, *c.* 0.25 mm long; sterile ovary *c.* 2 mm long, with a thickened creamy annular collar at its apex. Achenes lanceolate, usually straight, 2.3–2.7 × 0.7–0.9 mm excluding beak, dark brown to purplish at maturity; edges slightly thickened; glands along both dorsal edge (densely) and ventral edge (sparsely) from top to base, near base and neck areas on both faces, otherwise glabrous; beak 0.4–0.8 mm long, 0.2–0.3 mm wide, densely surrounded by glands, and with a white annular collar at its apex, 0.25–0.35 mm diameter. **Fig. 7.**

***Additional selected specimens examined*: Tasmania.** Ben Lomond District: Ben Lomond NP, disturbed area at roadside, near Ranger Headquarters, Nov 1978, *Noble 28044* (HO); Ben Lomond NP, Mar 1979, *Noble 28455* (HO); Mt Victoria, Apr 1985, *Moscal 10628* (HO). Central Highlands District: Cradle Mt Reserve at Waldheim, Mar 1949, *Curtis s.n.* (HO 52184); Hill between Granite Tor and High Tor, Jan 1985, *Moscal 9432* (HO); Quamby Bluff, summit, Mar 1986, *Moscal 12599* (HO); Below Eldon Bluff, Feb 1987, *Buchanan 9979* (HO); Lees Track, Jan 1988, *Moscal 15385* (HO); Mt Inglis, Jan 1989, *Collier 3965* (HO); Skullbone Plains South, end of Kenneth Lagoon Road, Mar 2012, *Schmidt-Lebuhn 1328* (HO). Derwent Valley District: Near Lake Dobson, Mt Field, Jan 1978, *Smith 260* (HO). South West District: Moores Bridge, Moonlight Ridge, Jan 1984, *Adams 49* (HO); Abbotts Lookout, Mar 1985, *Moscal 10349* (HO). West Coast District: S ridge of Mt Dundas, Jan 1987, *Collier 2127* (HO).

***Distribution and habitat*:** *Lagenophora latifolia* is endemic to Tasmania where it is widespread, but restricted to high altitudes from 800 m to 1,160 m (**Map 1**). It usually grows in eucalyptus open forests, open grassy woodland, subalpine woodland and rainforest edges along rivulet. It has been recorded in logged disturbed areas and along 4WD tracks.

***Phenology*:** Flowers mostly from November to February and fruits from January to March.

***Typification*:** A second sheet of this species collected by Gunn (K 00089128) is present at K, and has been designated an 'isotype' by Cabrera. However, this specimen was evidently collected at a later date, and cannot convincingly be linked to the lectotype.

***Affinities*:** *Lagenophora latifolia* is of similar appearance to *L. stipitata*, but differs by the leaves 0.5–3.5 cm long and 2.5–2.9× longer than wide (versus 1.5–7.7 cm long and 3.8–4.3× longer than wide for *L. stipitata*), the sinuate to undulate leaf margins (obtusely serrate for *L. stipitata*), glandular and eglandular hairs present on the scape (only broad-based eglandular for *L. stipitata*), and the achene beak 0.4–0.8 mm by 0.2–0.3 mm (0.6–1 mm by 0.15–0.25 mm for *L. stipitata*).

***Conservation status*:** At a few locations where *Lagenophora latifolia* is recorded, it is noted to be an occasional or infrequent species. However, as it seems to be able to tolerate certain disturbance, *i.e.* logging, a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

8. Lagenophora montana Hook.f., *London J. Bot.* 6: 113 (1847); *L. montana* var. *montana*, Hook.f., *loc. cit.*; *L. billardierei* var. *montana* (Hook.f.) Rodway, *Tasman. Fl. 77* (1907); *L. stipitata* var. *montana* (Hook.f.) Domin, *Biblioth. Bot.* 89: 653 (1930). **Type:** Tasmania. Circular Head, 11 January 1837, *R. Gunn 832* (lecto: K 000890122; *fide* Cabrera 1966: 303).

Lagenophora montana var. *major* Hook.f., *London J. Bot.* 6: 113 (1847). **Type:** Tasmania. Marlborough, 4 January 1841, *R. Gunn 833* (syn: K 000890119); Woolnorth, 30 March 1837, *R. Gunn 833* (syn: K 000890120).

Lagenophora montana var. *minor* Hook.f., *London J. Bot.* 6: 113 (1847). **Type:** Insula Van Diemen [Tasmania], *s.dat.*, *R. Gunn 832* (syn: K 000890124; *fide* Cabrera 1966: 303).

Perennial rhizomatous herb; roots and rhizomes fibrous, wiry, not bunched; 0.1–1(–1.5) mm diameter; stems often elongated to 12 cm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves 2–5 (–12), oblong, ovate, lanceolate, spathulate, 1.1–5 cm long, 0.3–1.2 cm wide (3.7–4.2× longer than wide), alternate along stem, sessile with a winged petiole-like base to 2 cm long; leaf apex obtuse or rounded; leaf margins denticulate, occasionally entire, often with 5–9 teeth, each tooth 0.01–1 mm long; upper leaf surface slightly dark green, glabrous or with 1–5 eglandular hairs per mm^2, each 0.1–0.4 mm long; lower leaf surface pale green, glabrous or with 1–2 eglandular hairs per mm^2, each 0.1–0.4 mm long; leaf margins with 5–10 eglandular hairs per mm^2, each 0.1–0.4 mm long; lateral veins obvious on dried material on both surfaces. Scapes more or less rounded or 4-squared, 1 only per tuft, 2–8(–14) cm long at anthesis, 5–8 (–14) cm long at fruiting stage, 0.4–1 mm diameter from lowest section to upmost section; indumentum *c.* 0.1 mm long, upright, antrorse

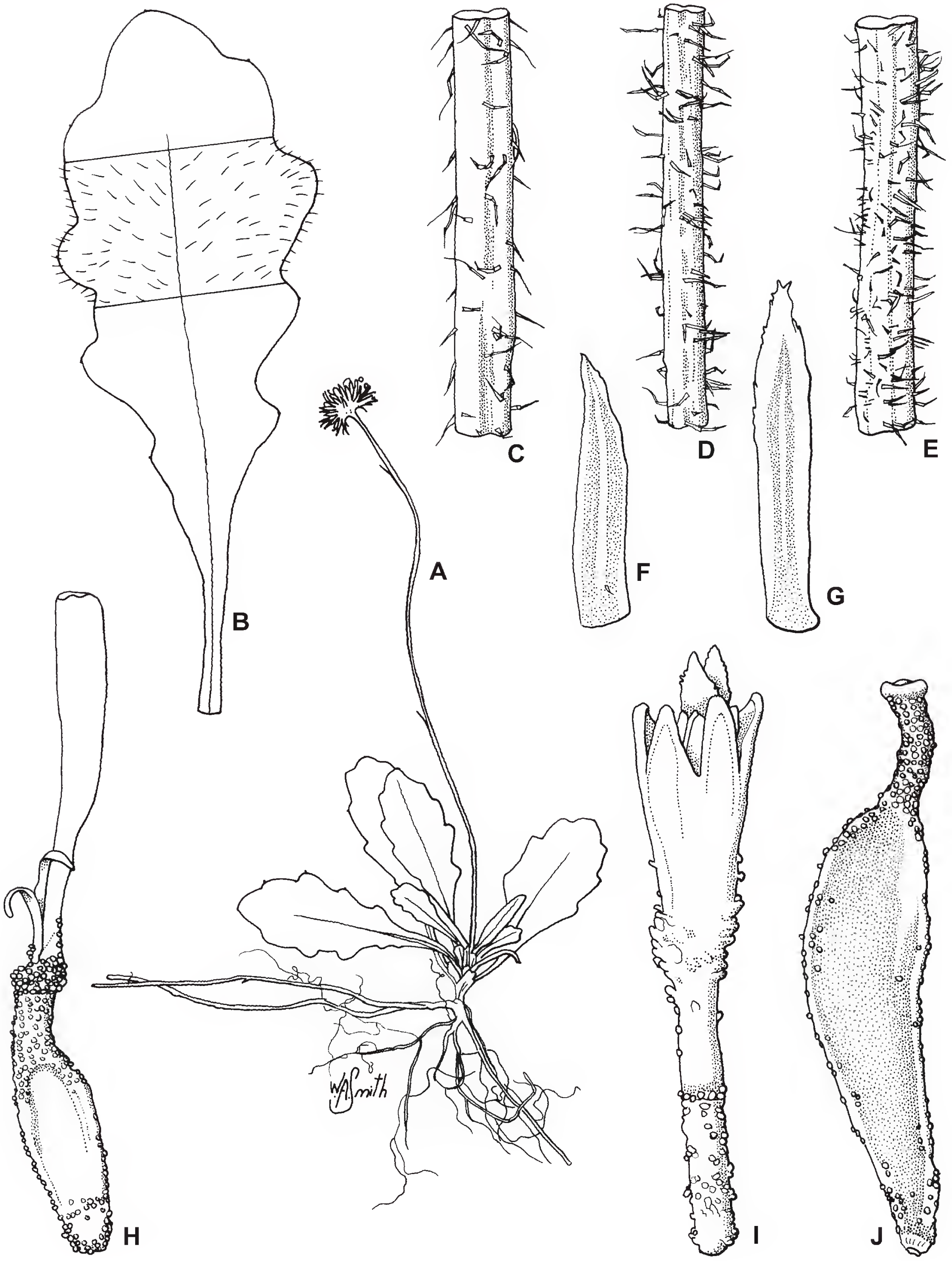

Fig. 7. ***Lagenophora latifolia.*** A. habit of whole plant with flowering inflorescence ×1. B. leaf with a section showing indumentum detail ×3. C–E. lower, mid and upper-sections of scape ×12. F. outer involucral bract ×16. G. inner involucral bract ×16. H. marginal floret ×24. I. disc floret ×24. J. achene ×24. All from *Moscal 12599* (HO). Del. W. Smith.

and more or less appressed, glabrous or 1–3 hairs per mm^2 at midpoint of scape, denser to the apex and near the involucre; bracts 2–5, upper ones *c.* 2 × 0.5 mm, lower ones *c.* 10 × 1 mm or smaller in size. Capitula 3–4 mm long, 5–9 mm diameter; involucral bracts (20)–47 in 3–4 rows, lanceolate to narrow lanceolate, glabrous on both surfaces, apex obtuse, margin mainly on the top half fringed and purple coloured; outer bracts *c.* 2.3 × 0.6 mm, inner bracts 3–3.5 × 0.7–1.3 mm. Receptacle flattened and disc-like, *c.* 2 mm diameter and 0.2 mm high. Ray florets *c.* 68, in 3–4 rows; tube 0.5–1 × 0.2–0.3 mm, glandular hairy; style branches 0.6–0.8 mm long; ligules 2.8–3.8 × 0.4–0.6 mm with 3 longitudinal obscure veins, mauve, light yellow, creamy, apex obtuse. Disc florets *c.* 20, corolla tubular, *c.* 1.6 mm long, light brown, outer surface with scattered short glandular hairs, lobes, 4(–5), deltate, 0.4–0.5 × 0.2–0.5 mm, and with purple tips; stamens 5, *c.* 0.8 mm long (anthers *c.* 0.5 mm long, filament *c.* 0.3 mm long); style branches *c.* 0.3 mm long; sterile ovary 0.8–1.6 mm long; pappus scales present as a thickened rim between corolla and sterile ovary. Achenes obovate or ovate, 1.8–2.2 × 0.8–1 mm excluding beak, dark purplish brown at maturity, with a creamy to light yellow coloured edge, glabrous throughout; edges slightly thickened; glands densely scattered along both dorsal (more) and ventral (less) edges, as well as on the top and bottom areas of both surfaces, otherwise glabrous; beak 0.2–0.4 mm long, densely surrounded by glands, with a white annular collar at its apex, *c.* 0.2 mm diameter. **Fig. 8.**

***Additional selected specimens examined*:** **South Australia.** Southern Lofty District: Knott Hill, Creek Line, Mar 1991, *Murfet 1027* (AD). **New South Wales.** Northern Tablelands District: 3 km N from entrance, Cathedral Rock NP, Feb 1996, *Ito 96018 et al.* (MEL, NSW). Southern Tablelands District: Mt Kosciusko NP, *c.* 5.5 km SE of Sawyers Hill along road to Adaminaby, Feb 1993, *Short 3984* (MEL, NSW). **Australian Capital Territory.** Moonlight Hollow Road, *c.* 15 km SW of Cotter Reserve, Jan 1972, *Adams 2677 & Barker* (CANB, K, NSW); *c.* 0.5 km W of Little Bimberi, Bimberi Range, Namadgi NP, Mar 1987, *Gilmour 6194* (CANB, NSW). **Victoria**. Wombargo, Jan 1949, *Wakefield 4164* (MEL); Forlorn Hope Track, S of Benambra – Wulgulmerang Road, Jan 1971, *Beauglehole 36200 & Finck* (MEL); Pheasant Creek Flora Reserve, Jan 1988, *Beauglehole 93216 & Strudwick* (MEL); *c.* 3.5 km NE of Lake Mountain, headwaters of Royston River, Feb 1993, *Clarke 2266* (MEL); *c.* 8.5 km S by E of Buxton, Blue Range Road at crossing of Storm Creek, Feb 1998, *Clarke 2261* (MEL). **Tasmania.** Ben Lomond District: Weldborough (Thomas Plain), Feb 1877, *Simson 515* (HO). Central Highlands District: Junction of boat ramp road and Poatina Highway, E side of Great Lake, Jan 1981, *Brown 185* (HO); Lees Paddocks, Upper Mersey River, Jan 1988, *Moscal 15341* (HO); Big Den, Lake River, 35 km W of Campbell Town, Dec 1990, *Collier 5029* (HO); N end, Bronte Lagoon, Feb 2013, *Wood 335 & Johnson* (HO). East Coast District: Mt Dromedary, Feb 1894, *Rodway s.n.* (HO 131636). Midlands District: Meander River Flats, S of Deloraine, Jan 1959, *Somerville s.n.* (HO 10048). South West District: Marsh near Mt Styx, Mar 1910, *Rodway s.n.* (HO 13431). West Coast District: Waratah, Jan 1893, *Simson 2726* (HO).

***Distribution and habitat*:** *Lagenophora montana* is known from Tasmania and south-eastern mainland Australia where it is distributed in Victoria, New South Wales, Australia Capital Territory and South Australia (**Map 5**). The species is also present in New Zealand where it is scarce (Drury 1974; de Lange *et al.* 2010). In Australia, it grows in subalpine heathland, scrubby grassland, savannah woodland and riparian scrub community near swamps. The soils can be sandy loam, loam and basalt. It has been recorded from 250 m to 1,500 m above sea level. One record from Tasmania is from 25 m altitude.

***Phenology*:** Flowers mostly from January to February and fruits mainly from February to March, also recorded through May.

***Affinities*:** *Lagenophora montana* is of similar appearance to the parapatric *L. stipitata* and *L. latifolia.* It differs from these two species by more or less glabrous leaves (leaves obviously hairy for *L. stipitata* and *L. latifolia*); scape hairs antrorse or appressed, *c.* 0.1 mm long (vs. retrorse, *c.* 0.2 mm); involucral bracts glabrous with obtuse apex (versus involucral bracts with some hairs, and apex acute to acuminate for both *L. stipitata* and *L. latifolia*).

***Conservation status*:** Although in most cases *Lagenophora montana* is an occasional or uncommon species where it was recorded, it is a relatively widespread in Tasmania, Victoria, South Australia, New South Wales

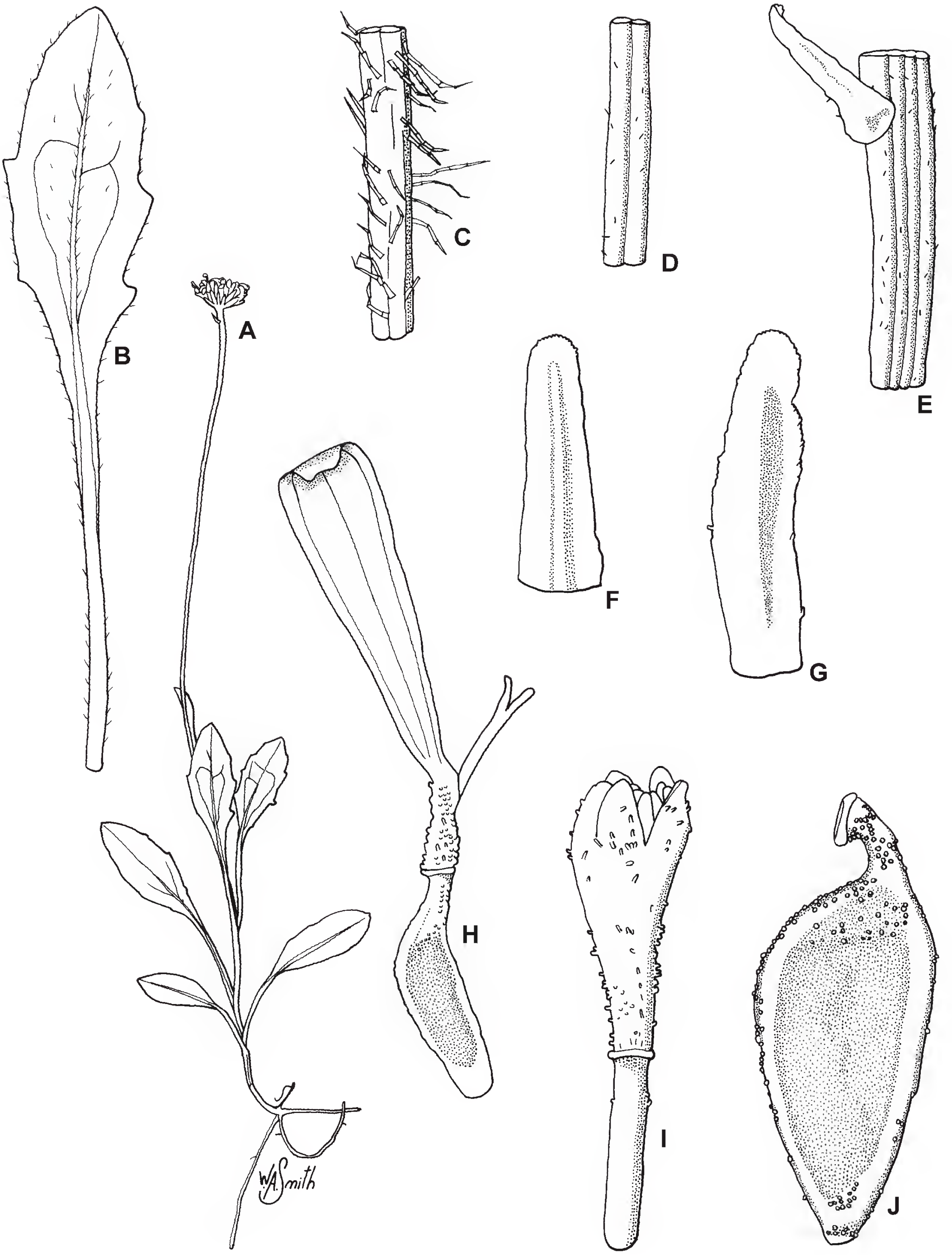

Fig. 8. ***Lagenophora montana.*** A. habit of whole plant with flowering inflorescence ×1. B. leaf ×3. C–E. lower, mid and upper-sections of scape ×12. F. outer involucral bract ×16. G. inner involucral bract ×16. H. marginal floret ×16. I. disc floret ×16. J. achene ×24. A–I from *Collier 5029* (HO); J from *Brown 185* (HO). Del. W. Smith.

and Australia Capital Territory. Therefore, a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

In New Zealand, *Lagenophora montana* is seriously threatened (de Lange *et al.* 2017).

9. Lagenophora platysperma Jian Wang ter & A.R.Bean **sp. nov.** with affinity to *L. huegelii* but differing by the much larger ligules, longer corolla tubes of disc floret, the larger achenes and the longer scapes at anthesis. **Typus:** Western Australia. Lowlands, private property at W end of Lowlands Road, Shire of Serpentine, Jarrahdale, 10 October 1994, *B.J. Keighery 2108* (holo: PERTH 06514421).

Perennial rhizomatous herb; roots fleshy, bunched, 0.5–3.2 mm diameter; stem usually absent; leaves and scapes usually readily detached from rootstock. Leaves 4–10, ovate, obovate or spathulate, (1–)5.4–11.5(–18) cm long, 2.1–3.3 cm (2.6–3.5× longer than wide), sessile with a winged petiole-like base to 7 cm long; leaf apex obtuse; leaf margins crenate or sinuate, usually with 15–23 teeth, each tooth 1–6 mm long; upper leaf surface slightly darker green than lower, with 1–4 hairs per mm^2, each 0.2–0.6 mm long; lower leaf surface with 4–8 hairs per mm^2, each 0.3–0.7 mm long; leaf margins with 8–12 hairs per mm^2, and each 0.4–0.8 mm long; lateral veins usually obscure on dried material on both surfaces. Scapes channelled, 1–4(–6) per plant, each 15–34 cm long at anthesis, 26–38 cm long at fruiting stage, *c.* 0.7 mm diameter but expanding to *c.* 1.8 mm at apex; indumentum 0.2–0.6 mm long, patent or retrorse, 5–10 hairs per mm^2 at midpoint of scape, dense to very dense at the distal end near the involucre; bracts 2–7, upper ones *c.* 10 × 1.5 mm, lower ones *c.* 30 × 6 mm or occasionally even larger. Capitula 5–7 mm long, 10–13 mm diameter; involucral bracts 36–42 in 4–6 rows, lanceolate to narrow lanceolate, glabrous or sparsely scattered hairy on the outer surface, apex acute and usually purple coloured, margin fimbriate especially on the distal half; outer bracts 2.5–4 × 0.5–1 mm, inner bracts 4–5.5 × 0.8–1.2 mm. Receptacle flat to slightly dome-shaped, 3.2–5.2 mm diameter and 1.4–1.6 mm high. Ray florets *c.* 50, in 2–4 rows; tube 0.6–0.8 mm long, *c.* 0.2 mm wide, glandular hairy; style branches *c.* 0.6 mm long; ligules (3.2–)4.5–6 × 0.8–1.2 mm, with 4–5 longitudinal obscure veins, creamy or purplish, apex obtuse. Disc florets 30–50; corolla tubular, *c.* 3.5 mm long, mauve, usually with minute glandular hairy on the outside of lower part, lobes 5, narrow deltate, *c.* 0.6 × 0.3 mm, and with purple tips; stamens 5, *c.* 2 mm long (anthers *c.* 1.2 mm long, filament *c.* 0.8 mm long); style branches *c.* 0.8 mm long; sterile ovary 1.5–2.2 mm long, no pappus scales between corolla and sterile ovary. Achenes obovate with lower part unequal, 3.7–4.5 mm long excluding beak, 2.1–3 mm wide, dark brown at maturity, with scattered hairs *c.* 0.2 mm long mainly on the top half section, becoming glabrous; edges not thickened; glands scattered along both dorsal (more) and ventral (less) edges; beak 0.5–1.1 mm long, densely surrounded by glands, and with a white annular collar at its apex, *c.* 0.35 mm diameter. **Fig. 9.**

***Additional specimens examined*: Western Australia**. Capel, Sep 1951, *Royce 3793* (PERTH); Lake Mealup, 20 km W of Pinjarra, Aug 2003, *Creed 74* (PERTH); Yanchep NP between Loch and Main road at N end of park, Aug 1964, *James 264* (PERTH); Medina, Sep 1965, *Turner 5475* (PERTH); 5 miles N of Lake Clifton Roadhouse, Sep 1971, *Paust 78* (PERTH); Uganda Road, Wanneroo, Aug 1978, *Cranfield s.n.* (PERTH 00443891); Vacant block opposite Department of Agriculture, Jarrah Road, South Perth, Aug 1980, *Cranfield R344* (PERTH); *ibid*, Aug 1981, *Cranfield R378* (PERTH); Forestdale Lake NR, Aug 1985, *Alford 28* (PERTH); Yanchep NP, Aug 1991, *Greig 4* (PERTH); William Bay NP, track N from Madfish Bay Road to 'petrified forest', Oct 1993, *Hammersley 1016* (PERTH); S of Saunders Street (W end), Henley Brook, Aug 1996, *Edgecombe 8* (PERTH); Koondoola Regional Bushland, Koondoola, Sep 1996, *Friends of Koondoola KRB63O* (PERTH); Caversham Air Base, Oct 1997, *Edgecombe 137* (PERTH); N of Gnangara Road, N side of Lot 46 Maralla Road, Ellenbrook, Aug 1999, *Trudgen & Trudgen MET 20586* (PERTH); Ellis Brook Valley Reserve, Sep 1999, *Bowler 246* (PERTH); Bodhinyana Monastery, 216 Kingsbury Drive, Serpentine, Jul 2002, *Nyanatusita 76* (PERTH); *c.* 12 km NE of Two Rocks, W of Wanneroo Road along Smokebush Road, Aug 2003, *Richardson KCR204* (PERTH); Roman Road Bushland, Mundijong, Aug 2009, *Wildflower Soc of WA/DEC BAUD02/22* (PERTH 08215901); Reserve No. 18644, southern end of Reserve adjacent Jackson Street, East Augusta, Sep 2009, *Matei TB35* (PERTH); Reserve No. 18644, 20 m N of Jackson Street, East Augusta, Sep 2011, *Bradshaw TB157C* (PERTH).

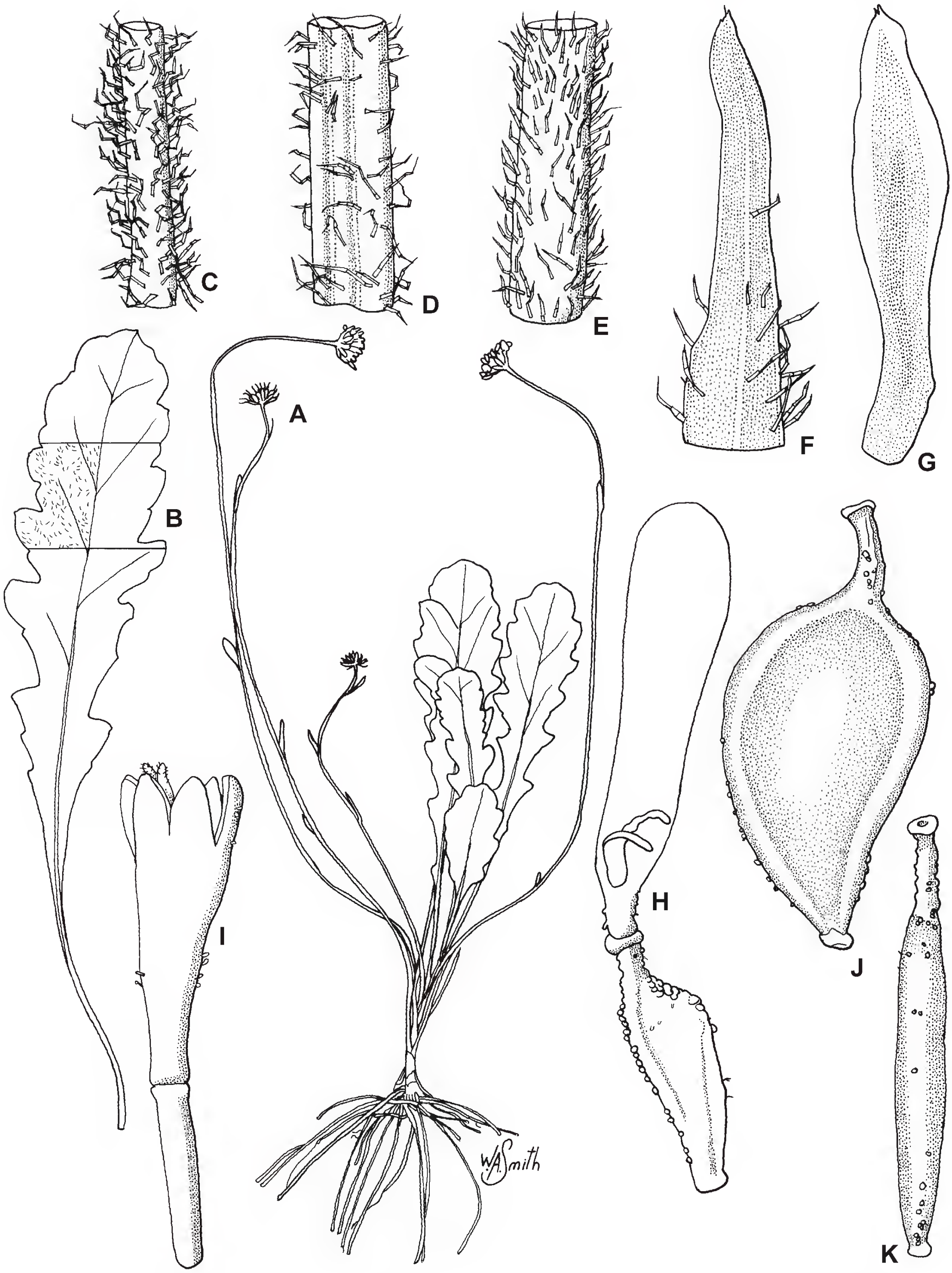

Fig. 9. ***Lagenophora platysperma.*** A. habit of whole plant with flowering and fruiting inflorescences ×0.4. B. leaf with a section showing indumentum detail ×0.8. C–E. lower, mid and upper-sections of scape ×18. F. outer involucral bract ×12. G. inner involucral bract ×12. H. marginal floret ×12. I. disc floret ×12. J. achene ×12. K. side view of achene ×12. A & J from *Wildflower Soc of WA/DEC, BAUD 02/22* (PERTH); B–E & K from *Keighery 2108* (PERTH [holotype]); F–I from *Turner 5475* (MEL). Del. W. Smith.

Distribution and habitat: Endemic to Western Australia, *Lagenophora platysperma* is mainly distributed along the west and south west coastal areas from Jurien to Albany (**Map 6**). It grows in variety of habitats, dense low heath and woodland of coast dunes, Jarrah open woodland, Jarrah-banksia woodland, eucalypt/allocasuarina woodland, eucalypt/melaleuca woodland, Jarrah/Marri forest, tall shrubland/sedgeland, wetland etc. on various sandy soils and/or loamy soils.

Phenology: Flowers mostly from July to October and fruits mainly from August to November.

Affinities: *Lagenophora platysperma* is of similar appearance to the parapatric *L. huegelii*, but differs by the larger ligules 4.5–6 × 0.8–1.2 mm (ligules 0.9–1.2(–3) × 0.2–0.4 mm in *L. huegelii*), longer corolla tubes of disc floret 0.6–0.8 mm long (versus *c.* 0.5 mm in *L. huegelii*), larger achenes 4.8–5.1 × 2.1–3 mm (versus 3.3–4.5 × 1.3–1.7 mm in *L. huegelii*), and the scapes at anthesis 15–34 cm long (versus 7–16 cm long in *L. huegelii*).

Conservation status: Although *Lagenophora platysperma* has a restricted coastal distribution in south-west Western Australia, it is often a frequent species that can be locally common where it occurs. The species is not considered to be threatened and a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

Etymology: From the Greek *platy* and *spermus*, meaning ‘broad-seed’. This species has the widest achenes of all *Lagenophora* species in Australia.

10. Lagenophora queenslandica Jian Wang ter & A.R.Bean, *Austrobaileya* 9: 469 (2016). **Type:** Queensland. Cook District: 3 km from Mt Molloy on Mareeba road, 12 April 1975, *L.A. Craven 3243* (holo: BRI; iso: CANB *n.v.*; L 1815328).

Illustrations: Wang & Bean (2016: 470, 471).

Perennial rhizomatous herb; roots fleshy, bunched, 0.8–2 mm diameter; no stem or short stem 1–5 mm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves 4–14, oblong, obovate or elliptical, 2.5–8 cm long, 1.2–2.4 cm wide (2.1–3.3× longer than wide), sessile or with a winged petiole-like base to 1 cm long; leaf apex obtuse; leaf margins crenate to sinuate, with 9–17 teeth, each tooth 0.5–1.5(–2) mm long; upper leaf surface green, with 0–2 eglandular hairs per mm^2, each 0.3–0.5 mm long; lower leaf surface pale green, with 0–3 eglandular hairs per mm^2, each 0.3–0.6 mm long; up to 7 eglandular hairs per mm^2 along the mid vein on both leaf surfaces; leaf margins with 5–7 eglandular hairs per mm^2, each 0.1–0.4 mm long; hairs to 1 mm or more at leaf base; lateral veins usually obscure on dried material on both surfaces. Scapes slightly channelled, (1–)3–8 per plant, each 9–17 cm long at anthesis, 11–25 cm long at fruiting stage, 0.6–1.2 mm diameter; indumentum *c.* 0.05 mm long, antrorse, more or less appressed, 4–7 hairs per mm at midpoint, rather denser towards apex; bracts 2–6, each up to 8 × 1.4 mm. Capitula 4–5 mm long, 6–9 mm diameter; involucral bracts 20–40 in 2–4 rows, oblong to obovate, glabrous, apex obtuse, with fringed margin on distal part, outer bracts 1–1.6 × 0.4–0.6 mm, inner bracts *c.* 2.1 × 0.5–0.7 mm. Receptacle convex, *c.* 2.7 mm diameter and 1 mm high. Ray florets 30–40, in 2–5 rows; tube *c.* 0.5 mm long and 0.2 mm diameter, with minute eglandular hairs; style branches 0.3–0.5 mm long; ligules 1.4–1.8 mm long, 0.3–0.4 mm wide, white to mauve, apex obtuse. Disc florets 18–30, corolla tubular, 1.7–1.8 mm long, light yellow, outer surface with minute glandular hairs, lobes 5, deltate, 0.1–0.3 mm long; sterile ovary 0.6–0.9 mm long. Achenes obliquely oblanceolate, 2–3 × 0.6–1.2 mm excluding beak, light brown to brown at maturity; edges more or less thickened; glands distributed from distal end to base, especially along dorsal edge, otherwise glabrous; beak 0.2–0.3 (–0.4) mm long and 0.2–0.3 mm wide, densely glandular throughout, lacking a thickened white annular collar at its apex.

Additional selected specimens examined: **Queensland.** Cook District: Portland Roads, Jun 1948, *Brass 18995* (BRI); Byerstown Range, Feb 2016, *McDonald 17663* (BRI); Brooklyn Homestead near Rifle Creek/Lustre Creek junction, Jan 1996, *Godwin MGC4202 & Russell* (BRI); 500 m W of MBA [Mareeba] –Mt Molloy Road opposite Hodzic Road, Mar 2002, *Thompson 2563 & Newton* (BRI); 19 km E of Kennedy Highway along Tinaroo Creek road, 0.9 km W of road junction, Apr

2003, *Neldner 4206* (BRI); E of Cobra Creek between Tinaroo Falls & Malone Road turnoff on Cairns Road, Feb 1962, *Webb 5875 et al.* (BRI); 9.1 km from Forsayth pub along Einasleigh Road, near Mt Talbot turnoff, Feb 2011, *McDonald 10591* (BRI). North Kennedy District: Forty Mile Scrub NP, Mar 1993, *Fensham 1113* (BRI); 37.4 km by road to Princess Hills, from junction with Kennedy Highway near Mt Garnet, Jan 2005, *McDonald 3589* (BRI); White Mountain NP near Warang, Apr 2000, *Wannan 1747* (BRI, MEL, NSW). Leichhardt District: Homevale Station, 3.5 km W of station [homestead], Mar 1994, *Champion 1033 et al.* (BRI). Mitchell District: Warang, WNW of Torrens Creek, Apr 1990, *Cumming 9662* (BRI). Port Curtis District: Eden Bann road, W of Canoona, Mar 1994, *Bean 7541* (BRI); Neerkool Creek, *s.dat.*, *Bowman s.n.* (MEL 2161644); 1.5 km SW along E-W road from junction with Elanora track, Razorback Sector, Shoalwater Bay Training area, Feb 2014, *Halford QM939* (BRI). Burnett District: SF 43, 16.6 km along Hawkwood Road, SW of Mundubbera, Apr 1997, *Bean 11955* (BRI); Near regrowth experiment, Narayen, Nov 1969, *s. coll.* (BRI [AQ583268]).

***Distribution and habitat*:** *Lagenophora queenslandica* is endemic to central and north Queensland. Most records are from coastal and near coastal areas from Mareeba to Rockhampton, but there are several occurrences further inland e.g. White Mountains near Pentland, near Mundubbera, and Springsure. There is also a record from Portland Roads on Cape York Peninsula (**Map 7**). The species usually inhabits *Eucalyptus* open forests and *Melaleuca* woodlands on ridges or alluvial plains. There is also a record from dry rainforest on basalt soil.

***Phenology*:** Flowers and fruits are mostly from January to April. However, there are also records of flower or fruits in October, November, May and June.

***Affinities*:** *Lagenophora queenslandica* is of similar appearance to the parapatric *L. sublyrata*, but differs by the leaves more consistently obovate (leaf length/width ratio 2.1–3.3 versus 2.5–4.1 for *L. sublyrata*); the shorter and broader involucral bracts; the lack of hairs at the base of the achene; the glands surrounding the achene beak (confined to the dorsal side in *L. sublyrata*), and the achene beak only 0.2–0.3(–0.4) mm long (0.4–0.8 mm long for *L. sublyrata*), and without the obvious thickened white annular collar at its apex.

***Conservation status*:** *Lagenophora queenslandica* can be relatively common where it was recorded. It is wide-spread from the central coastal Queensland to the Cape York Peninsula. Therefore, a **Least Concern** conservation status is recommended using the IUCN (2012) criteria.

11. Lagenophora stipitata (Labill.) Druce, *Rep. Bot. Soc. Exch. Club Brit. Isles* 4: 630 (1917); *Bellis stipitata* Labill., *Nov. Holl. Pl. Sp.* 2: 55, t. 205 (1806); *Lagenophora billardierei* Cass., *Dict. Sci. Nat., ed. 2. [F. Cuvier]* 25: 111 (1822), *nom. illeg.*; *L. stipitata* var. *stipitata*, Domin, *Biblioth. Bot.* 89: 653 (1930). **Type:** Tasmania. "Habitat in capite Van-Diemen", 1792 or 1793, *J.H.H. de Labillardière s.n.* (lecto: FI 006144; isolecto: M 0029701, P 00742956; *fide* Wang & Bean 2016: 465).

Lagenophora billardierei var. *pusilla* DC., *Prodr. [A. P. de Candolle]* 5: 307 (1836). **Type:** Australia. *s.loc.*, *s.dat.*, *J.[H.H.] de Labillardière s.n.* (holo: G 00454018).

Perennial rhizomatous herb; roots and rhizomes fibrous, wiry, not bunched, 0.1–1 mm diameter; stem very short (leaves in basal rosette) or often elongated (leaves alternate along stem); leaves and scapes firmly attached to stem and/or rootstock. Leaves 5–20, narrowly obovate to spathulate, 1.5–7.7 cm long, 0.4–1.8 cm wide (3.8–4.3× longer than wide), sessile or with a winged petiole-like base to 2 cm long; leaf apex obtuse; leaf margins usually obtusely serrate with 5–15 serrations, each serration 1–3 mm long; upper leaf surface green, lower leaf surface pale green; both surfaces with eglandular hairs 0.2–0.35 mm long, 7–9 per mm^2; leaf margins with 10–15 eglandular hairs per mm^2, each 0.2–0.3 mm long; leaf veins obscure on dried material on both surfaces. Scapes channelled, 1–5 per tuft, each 4–15 cm long at anthesis, 5–19 cm long at fruiting stage, 0.5–1.2 mm diameter; indumentum 0.2–0.4 mm long, spreading or retrorse to patent, 2–10 hairs per mm at midpoint of scape, equally dense throughout or denser towards apex; bracts 1–3 (–5) up to *c.* 8 mm long and 1 mm wide. Capitula *c.* 6 mm long, 8–12 mm diameter; involucral bracts 50–60 in 5–6 rows, linear to narrow lanceolate, entire, apex acute to occasionally acuminate, with fringed margins on distal half; outer bracts *c.* 2.1 × 0.3 mm, inner bracts *c.* 3.5 × 0.4 mm, all with hairs along the midrib. Receptacle convex, 2–3.2 mm diameter, 1.2–1.5 mm high. Ray florets 40–70, in 2–4 rows; tube 0.7–0.9 mm long, *c.* 0.3 mm diameter, minute hairy; style branches *c.* 0.5 mm long; ligules 2.3–3.3 mm long, 0.3–0.5(–0.8) mm wide with 3 longitudinal veins, blue, purple or light yellow, apex acute to acuminate. Disc florets *c.* 15, corolla, tubular, 2–2.5 mm long, yellow-green, outer surface glandular hairy on bottom part and short hairy on top part; lobes 5, deltate, 0.2–0.3 mm long, purplish brown, minute hairy. Achenes obliquely oblanceolate, 2.2–3 × 0.7–0.9 mm excluding beak, light dark brown to purplish brown at maturity; edges slightly thickened and light-coloured in contrast with the faces; glands extending from distal end to base, especially along dorsal edge, but mainly basal and near apex, otherwise glabrous; beak 0.6–1 mm long, 0.15–0.25 mm wide, densely glandular throughout, with a thickened white annular collar at its apex, 0.25–0.3 mm diameter.

***Additional selected specimens examined*:** **Western Australia.** Lease Road, Donnelly River Valley, Dec 1999, *Tunsell et al. 24* (PERTH). **South Australia.** SOUTHERN LOFTY DISTRICT: Colonial Road, Upper Morialta, Dec 1991, *Bates 26628* (AD). KANGAROO ISLAND DISTRICT: Flinders Chase, in the Koala area at Rocky River, Dec 1965, *Eichler 18524* (AD, NE, NY). SOUTH-EASTERN DISTRICT: State Forest, National Trust Lease, adjacent to western side of Lower Glenelg NP, Oct 1982, *Weber 7787* (AD). **Queensland.** DARLING DOWNS DISTRICT: Head of Racecourse Creek, Girraween NP, Mar 2009, *Holmes 245 & Holmes* (BRI); 250 m south of "L" junction, Girraween NP, Jan 2016, *Bean 32691 & Wang* (BRI, MEL); between "K" junction and "L" junction, Girraween NP, Jan 2016, *Bean 32695 & Wang* (BRI, NSW); "Z" junction, Girraween NP, just west of Bald Rock, Jan 2016, *Bean 32719 & Wang* (BRI). **New South Wales.** NORTHERN TABLELANDS DISTRICT: Upper slopes of Bald Rock, Bald Rock NP, N of Tenterfield, Dec 2015, *Bean 32542* (BRI); Warra SF, E of Llangothlin at Crown Mountain FR entrance, Feb 1995, *Hunter 2715 et al.* (BRI). CENTRAL COAST DISTRICT: Macquarie Pass NP, SW of Wollongong, Dec 2000, *Bean 17159* (BRI). **Australian Capital Territory.** Namadgi NP, 9.7km N of Mt Aggie gate along Mt Franklin Road, Mar 1996, *Donaldson 1053, Edwards & Conway* (CANB). **Victoria.** 17 km S from Whitfield in Wabonga Plateau State Park, Dec 1986, *Piesse 664* (MEL); Lucyvale, on Cravensville Road, 900m NW of Mangans Road, Feb 1994, *Molnar & Sutter s.n.* (MEL 2025764; The Lakes NP, Rotamah Island, Oct 1986, *Crawford 529* (MEL); *c.* 3.5 km NE of Lake Mountain, headwaters of Royston River, Feb 1993, *Clarke 2265* (MEL). **Tasmania.** CENTRAL HIGHLANDS DISTRICT: Lake Myrtle Track, N of Lake Bill, Mar 1987, *Collier 2267* (HO). EAST COAST DISTRICT: St Peters Pass, Jan 1931, *Rodway 21* (HO). MIDLANDS DISTRICT: Meander River, Feb 1986, *Moscal 12504* (HO). NORTH WEST DISTRICT: Mermaid Hut track, Three Hummock Island, Oct 1995, *Harris & Balmer s.n.* (HO 444872). SOUTH WEST DISTRICT: Nye Bay, Jan 1986, *Buchanan 7712* (HO).

***Distribution and habitat*:** *Lagenophora stipitata* is widespread in Australia, occurring in Western Australia, South Australia, Queensland, New South Wales, Australian Capital Territory, Victoria and Tasmania (**Map 8**). It has also been reported from Mangonui County, North Auckland in New Zealand (Drury 1974); and it has been found along much of western Northland to the western Waikato, and also along the eastern side of the Coromandel Peninsula (P. de Lange pers. comm.). In Australia, it has been recorded from near sea level (especially in Tasmania) to about 1,300 m altitude in various habitat, *i.e. Nothofagus* and *Leptospermum* forest, tall wet sclerophyll forest, mixed tall closed forest, open eucalypt forest, eucalypt woodland, dry and wet heathlands, scrub forest, dune swale etc.

***Phenology*:** In Queensland, flowers are recorded in January and March; fruits in January and March. In New South Wales, Victoria, South Australia and Tasmania, flowers from September to March and fruits from November to April.

***Conservation status*:** *Lagenophora stipitata* is widespread in the southern states of Australia. It is recorded from a number of national parks and not considered to be threatened. A **Least Concern** conservation status is recommended based on the IUCN (2012) criteria.

12. Lagenophora sublyrata (Cass.) A.R.Bean & Jian Wang ter, **comb. nov.**; *Ixauchenus sublyratus* Cass., *Dict. Sci. Nat., ed. 2. [F. Cuvier]* 56: 176 (1828). **Type:** New South Wales. Port Jackson, November–December 1819, *C. Gaudichaud* (lecto: P 00742955†, image only extant; *fide* Bean & Wang 2017: 168). **Epitype:** New South Wales. Hornsby, April 1914, *W.F. Blakely s.n.* (NSW 10275; *fide* Bean & Wang 2017: 168).

Ixauchenus lyratus Less., *Syn. Gen. Compos.* 193 (1832), *nomen nudum*.

Lagenophora billardierei var. *media* DC., *Prodr. [A. P. de Candolle]* 5: 307 (1836). **Type:** Nova Hollandia, [in 1823], *F.W. Sieber 505* (syn: G 00454010, HAL, NY 00180436).

Lagenophora billardierei var. *glabrata* DC., *Prodr. [A. P. de Candolle]* 5: 307 (1836). **Type:** Nouvelle Holland, in 1816, from Lambert's herbarium (syn: G 00454009).

Lagenophora lanata A.Cunn., *Ann. Nat. Hist.* 2: 126 (1839). **Type:** New Zealand. Between the Waitangy and Keri-Keri Rivers, in 1834, *R. Cunningham* (syn: K 000890104).

Perennial rhizomatous herb; roots fleshy, bunched, 0.5–1.5 mm diameter; no stem or short stem to *c.* 1 cm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves (4–) 7–17, obovate, oblanceolate, elliptical, spathulate, (1–)2–3(–9) cm long, (0.4–)0.6–1.4(–2.2) cm wide (2.5–3.3(–4.1) × longer than wide), sessile or with a winged petiole-like base to 3 cm long; leaf apex obtuse or rounded; leaf margins toothed, crenate to sinuate, with (5–)7–9(–19) teeth, each tooth (0.2–)0.5–1(–2) mm long; upper leaf surface green, glabrous or with 1–2(–7) hairs per mm^2, each 0.1–0.2 mm long; lower leaf surface pale green, glabrous or with 2–4(–8) hairs per mm^2, each 0.1–0.3 mm long; leaf margins with 6–12 hairs per mm^2, each 0.1–0.2 mm long; leaf veins usually obscure on dried material on both surfaces. Scapes channelled, 1–7 per tuft, each (4–)7–19 cm long at anthesis, (4–)6–23(–31) cm long at fruiting stage, (0.3–)0.5–0.6(–0.8) mm diameter, 0.3–0.8 mm thick from lowest to upmost section; indumentum *c.* 0.1 mm long, antrorse, more or less appressed; 2–10 hairs per mm^2 at midpoint of scape, slightly denser towards apex; bracts 2–5, upper ones 1.3–1.7 × 0.2 mm, lower ones 3–5.5 × 0.5–0.8 mm or occasionally even larger. Capitula (2.5–)4–5(–6) mm long, (2.5–)4–5.4(–11) mm diameter; involucral bracts (20–)36 in 4–5 rows, lanceolate, oblong to obovate, glabrous, apex obtuse, acute, ciliate or with fringed margin on distal part, outer bracts 1.2–1.9 × 0.3–0.6 mm, inner bracts 2.1–2.6 × 0.5–0.7 mm. Receptacle convex, 1.5–2(–2.7) mm diameter, 0.8–1.2 mm high. Ray florets 20–37(–72) in 2–5 rows; tube 0.4–0.5 mm long, 0.1–0.2 mm wide, glandular hairy; style branches 0.3–0.4 mm long; ligules (1.8–)2.1–2.2(–3) mm long, 0.15–0.4 mm wide, with longitudinal veins obscure, creamy to mauve, apex obtuse. Disc florets (10–)30, corolla tubular, 1.5–1.9 mm long, light yellow, outer surface with sparse glandular hairs; corolla lobes 4 or 5, deltate, 0.1–0.3 mm long × 0.3–0.4 mm wide; stamens 4 or 5, 0.6 mm long; style branches *c.* 0.3 mm long; sterile ovary 0.7–0.8 mm long; pappus scales 1 or 2, 0.1–0.2 mm long. Achenes lanceolate, obliquely oblanceolate, 2.4–2.8(–3.3) × 0.6–0.8 mm excluding beak, light brown to dark brown at maturity; edges more or less thickened; glands confined to dorsal side of beak and adjacent area of achene, 1–5 eglandular hairs usually present at base of achene, otherwise glabrous; beak 0.4–0.6 mm long, with a thickened white annular collar at its apex, 0.15–0.25 mm diameter.

***Additional selected specimens examined*: Queensland.** Cook District: Daintree NP, Adeline Creek headwaters, ridge to Hill 929, May 1999, *Forster 24527 & Booth* (BRI, MEL). North Kennedy District: Taravale near Hell Hole Creek, 0.5–1 km E of homestead, Mar 1987, *Jackes 8703* (BRI). South Kennedy District: Snake Road, SF 62, at locked gate, NE of Eungella Township, Feb 2003, *Bean 20045* (BRI). Leichhardt District: Carnarvon Gorge, Carnarvon NP, NW of Injune, Apr 1994, *Morley s.n.* (BRI [AQ 471673]). Port Curtis District: 10 km SE of Forestry Camp, Kroombit Tops, Dawes Range, 64 km SW of Calliope, Dec 1983, *Sharpe 3421* (BRI). Burnett District: Gorge Oaky LA, Coominglah SF, NW of Monto, Jun 1996, *Bean 10416* (BRI). Wide Bay District: Compartment 56A, just S of Benarige Creek track junction, SF 57, Parish of St Mary, Mar 1995, *Grimshaw 2041 & Turpin* (BRI). Darling Downs District: Mt Colliery area off Gambubal Road, 'Paddy's Gully' adjacent to Main Range NP, Apr 2015, *Forster PIF42568 et al.* (BRI). Moreton District: Kobble Creek, *c.* 3.5 km from Hawkins Road, Samsonvale, Apr 2003, *Phillips 1088 & Phillips* (BRI). **New South Wales.** Central Coast District: Liverpool, Oct 1965, *Coveny s.n.* (NSW 98345); Woolwash, Campbell Town, Dec 1966, *McBarron 13738* (NSW); Wollemi NP, SE section, W end of Culoul Range, Mar 1981, *Haegi 2045* (NSW). South Coast District: Flat Rock Creek, Nowra, Jan 1933, *Rodway 4892–4* (NSW); Nowra Road, 5 miles [8.3 km] E of Nerriga, *Adams 1473*, Oct 1965 (NSW). North Coast District: Grafton – Armidale Road, Glenfernie FR, Dec 1893, *Maiden s.n.* (NSW 457126). **Victoria.** Mt Elizabeth, Feb 1971, *Beauglehole 37109* (MEL);

Yalmy Forest Management Block, East Gippsland, Nov 1983, *Chesterfield 10* (MEL); Croajingolong NP near Mallacoota, track to Sandy Point from Mallacoota – Genoa Road, Nov 2016, *Karunajeewa 1490* (MEL). **South Australia.** SOUTHERN LOFTY DISTRICT: Cox Scrub, Damp gully in S corner of the park, Feb 2007, *Duval 320 & Erickson* (AD). SOUTH EASTERN DISTRICT: Honans Scrub, Nov 1991, *Bates 26488* (AD). MT LOFTY RANGE DISTRICT: Near Mt Lofty Railway Range, Adelaide Hills, Nov 1948, *Cleland s.n.* (AD 97220069). **Tasmania.** EAST COAST DISTRICT: Near Freestone Hill (20 km N of Swansea), Dec 1984, *Buchanan 4807* (HO). NORTH EAST DISTRICT: Low Head, road to aerodrome, Dec 1965, *Curtis s.n.* (HO 13462). NORTH WEST DISTRICT: Somerset, Feb 1948, *Curtis s.n.* (HO 13464).

***Distribution and habitat*:** *Lagenophora sublyrata* is the most widespread species in the genus. It has been recorded (as *L. gracilis* or *L. lanata*) in south Asia (e.g. China, India, Sri Lanka), south-east Asia (e.g. Thailand), Malesia (e.g. Java, New Guinea), Australia and New Zealand. In Australia, it occurs in South Australia, Queensland, New South Wales, Australia Capital Territory, Victoria and Tasmania (**Map 9**) where it mainly inhabits eucalypt or *Melaleuca* dominated open forest or woodland on a wide range of soils from near sea level up to 1,500 m altitude.

***Phenology*:** Flowers and fruits have been recorded mainly from spring, summer and autumn.

***Note*:** *Lagenophora sublyrata* is a widespread species with variable leaf shape, indumentum and plant size. New Zealand specimens received on loan from AK are quite hairy and small in stature, but features of the achene, scape and involucral bracts are consistent with typical plants from eastern New South Wales, Victoria and Tasmania. The distribution of this species in the northern hemisphere requires examination. Occurrences outside Australia and New Zealand require confirmation with regards to their taxonomy and nomenclature.

***Conservation status*:** As the most widely distributed species in the genus, *Lagenophora sublyrata* occurs in numerous national parks. Therefore, it is not considered to be threatened in Australia and a **Least Concern** conservation status is recommended based on the IUCN (2012) criteria.

Excluded names

Lagenophora emphysopus Hook.f., *Fl. Tasm.* 1: 189 (1855). (= **Solenogyne bellioides**).

Lagenophora solenogyne F.Muell., *Fragm.* 5(34): 62 (1865). (= **Solenogyne bellioides**).

Lagenophora bellioides (Cass.) Druce, *Rep. Bot. Soc. Exch. Club Brit. Isles* 4(Suppl. 2): 630 (1917). (= **Solenogyne bellioides** Cass.).

Lagenophora gunnii (Hook.f.) J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 51: 58 (1927). (= **Solenogyne gunnii** Hook.f.).

Lagenophora gunnii var. *glabra* Domin, *Biblioth. Bot.* 89: 653 (1930). (= **Solenogyne dominii** L.Adams).

Dubious names

Lagenophora billardierei var. *microcephala* Benth., *Fl. Austral.* 3: 507 (1866); *L. stipitata* var. *microcephala* (Benth.) Domin, *Biblioth. Bot.* 89: 653 (1930). Identity unknown; no type cited.

Lagenophora billardierei var. *normalis* Benth., *Fl. Austral.* 3: 507 (1866), *nom. inval.*; this is presumably the type variety.

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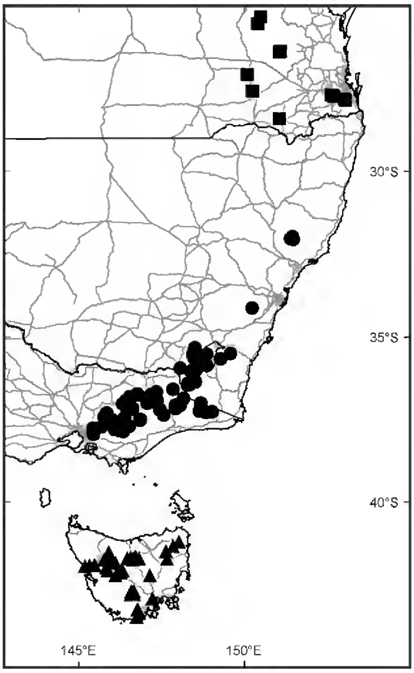
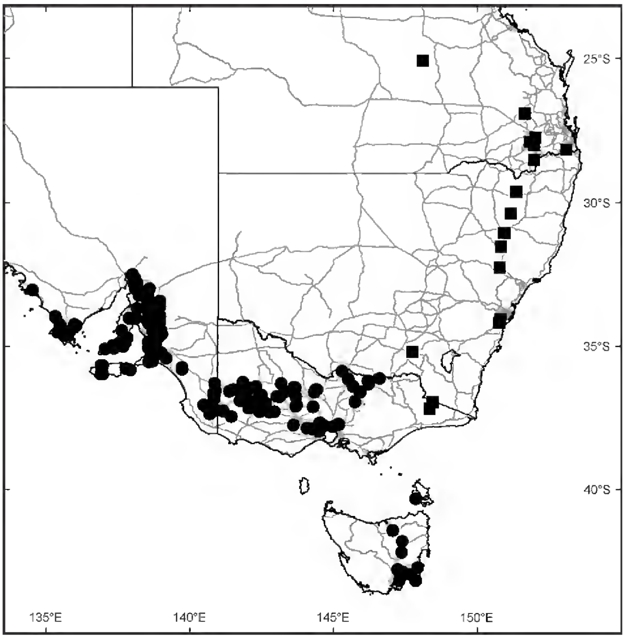
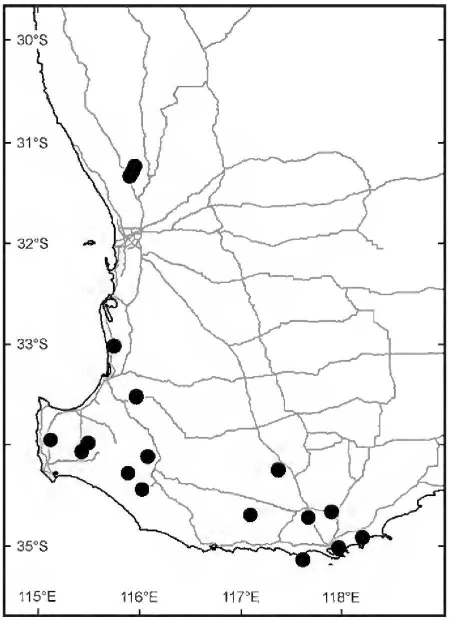

30°S
35°S
40°S
145°E
150°E

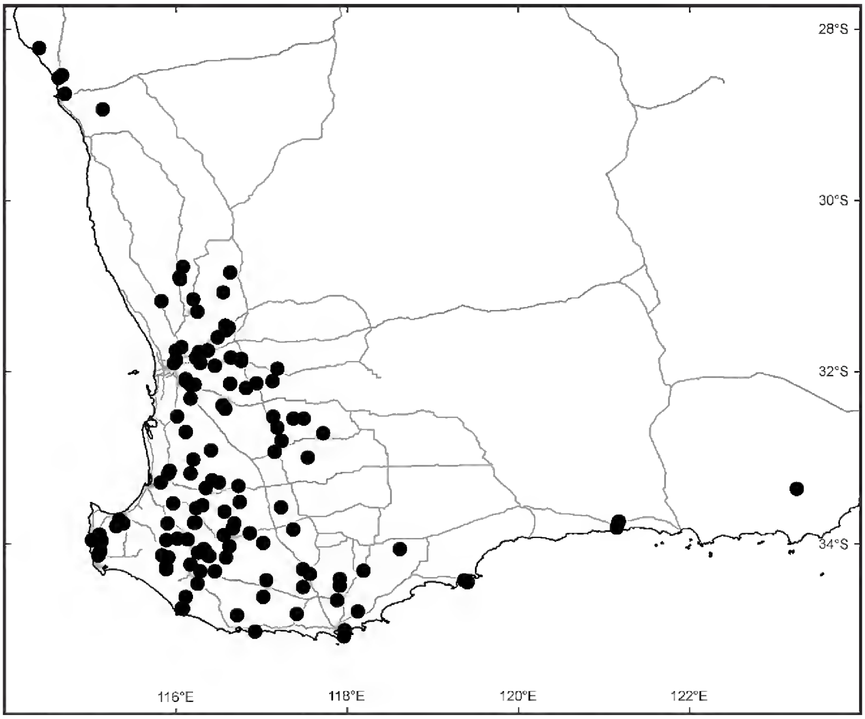
Map 1. Distribution of ***Lagenophora adenosa*** ●, ***L. fimbriata*** ■, ***L. latifolia*** ▲.


25°S
30°S
35°S
40°S
135°E
140°E
145°E
150°E

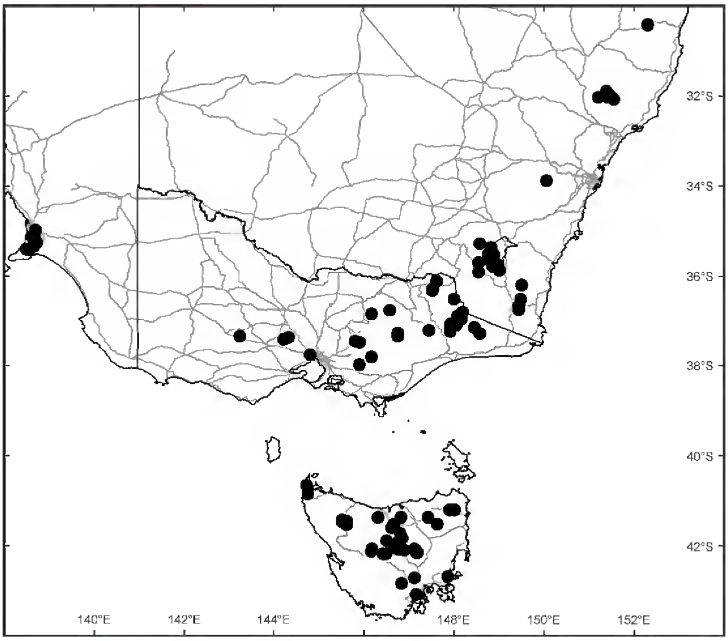
Map 2. Distribution of ***Lagenophora brachyglossa*** ■, ***L. gunniana*** ●.


30°S
31°S
32°S
33°S
35°S
115°E
116°E
117°E
118°E

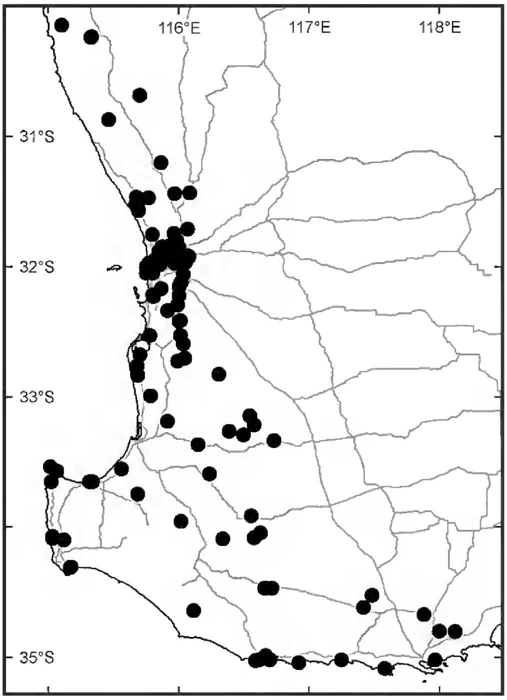
Map 3. Distribution of ***Lagenophora gracilis***.


28°S
30°S
32°S
34°S
116°E
118°E
120°E
122°E

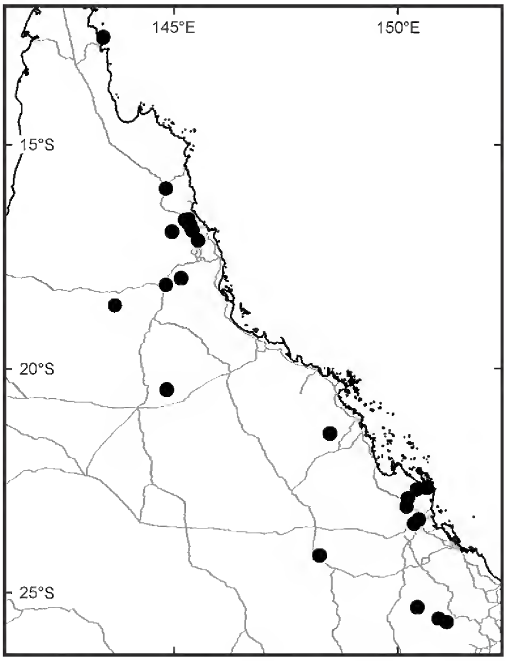
Map 4. Distribution of ***Lagenophora huegelii***.


32°S
34°S
36°S
38°S
40°S
42°S
140°E
142°E
144°E
148°E
150°E
152°E

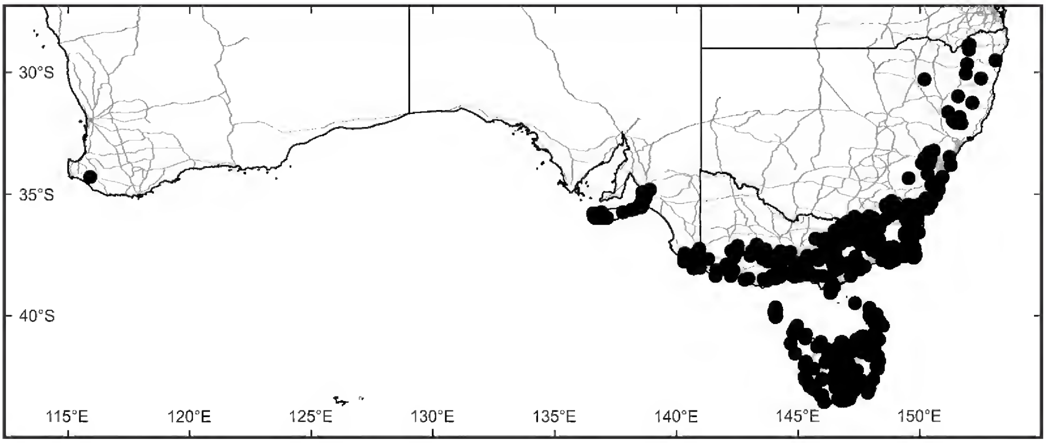
Map 5. Distribution of ***Lagenophora montana*** in Australia.


116°E
117°E
118°E
31°S
32°S
33°S
35°S

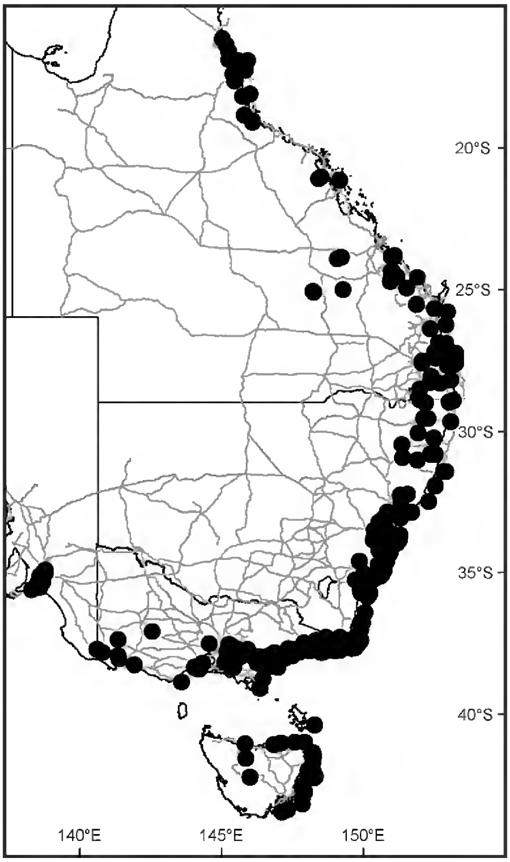
Map 6. Distribution of ***Lagenophora platysperma***.


145°E
150°E
15°S
20°S
25°S

Map 7. Distribution of ***Lagenophora queenslandica***.


30°S
35°S
40°S
115°E
120°E
125°E
130°E
135°E
140°E
145°E
150°E

Map 8. Distribution of ***Lagenophora stipitata*** in Australia.


20°S
25°S
30°S
35°S
40°S
140°E
145°E
150°E

Map 9. Distribution of ***Lagenophora sublyrata*** in Australia.

Brachychiton guymeri J.A.Bever., Fensham & P.I.Forst. (Sterculiaceae), a new species from north Queensland

Rod J. Fensham[1,2], Jamie A. Beveridge[2] & Paul I. Forster[1]

Summary

Fensham, R.J., Beveridge, J.A. & Forster, P.I. (2019). *Brachychiton guymeri* J.A.Bever., R.J.Fensham & P.I.Forst. (Sterculiaceae), a new species from north Queensland. ***Austrobaileya*** **10(3): 443–457.** The new species *Brachychiton guymeri* is described and illustrated from north Queensland and is thought to be related to *B. bidwillii* F.Muell. *Brachychiton guymeri* is known from two populations in dry rainforest or amongst rainforest elements in grassy savanna with high rock cover and has a current conservation status of Endangered. Fifty three dry rainforest patches were searched within 50 km of the original two locations but no new populations were located. The species is represented by a broad spectrum of size-classes in dry rainforest but in savanna, fire can ‘top-kill’ larger plants resulting in a high density of small stems emanating from coppice. A revised conservation status of Vulnerable is recommended.

Key Words: Sterculiaceae, *Brachychiton*, *Brachychiton bidwillii*, *Brachychiton guymeri*, *Brachychiton* sp. (Blackwall Range R.J.Fensham 971), Australia flora, Queensland flora, new species, taxonomy, conservation status

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Introduction

Brachychiton Schott & Endl. is a genus of some 36 species in the family Sterculiaceae, consisting of predominantly dry season deciduous trees and shrubs found across northern and eastern Australia, and New Guinea (Guymer 1988). *Brachychiton* includes the iconic ‘bottle-trees’ with swollen trunks and are commonly cultivated ornamental plants with attractive bell-shaped flowers. Additionally, the trunks and leaves of several species are also utilised to provide fodder for livestock in dry periods.

This paper provides a taxonomic description of the new species *Brachychiton guymeri* J.A.Bever., Fensham & P.I.Forst. (previously *B.* sp. (Blackwall Range R.J.Fensham 971), and identifies characters that distinguish it from previously described species. *Brachychiton guymeri* is known from two populations south-east of Collinsville. The larger population (Blackwall Range) occurs in fragmented dry rainforest on a boulder field and the smaller population (Aureole) was located where elements of dry rainforest occur within savanna on an unnamed geological feature forming an aureole with an inner diameter of approximately 3 km. These two populations are 10 km apart. The association of this new species to dry rainforest patches is significant in relation to the speciation hypothesis that we present in this paper, so a short overview of the ecology of this vegetation type is given to provide context.

In broad terms the vegetation of northern Australia can be separated into savanna, which is fire-prone and adapted to recover after fire, and fire-sensitive rainforest, which excludes fire (Bowman *et al.* 2010; Fensham 2012; Murphy & Bowman 2012; Ondei *et al.* 2016). The undescribed *Brachychiton* species was first discovered in December 1992 during an extensive survey of dry rainforest (Fensham 1995). Dry rainforest describes vegetation found in seasonally dry areas which share structural, floristic and ecological affinities with mesic rainforest (Fensham 1995). In northern Australia, dry rainforest is widely distributed, though generally as

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small, highly fragmented patches, occurring predominantly in Queensland and the Northern Territory, but also extending into Western Australia and New South Wales. Dry rainforest can occur in areas with as little as 500 mm annual precipitation (Russell-Smith 1991; Fensham 1995); however, as rainfall is reduced, so too is frequency of occurrence, patch size and tree species diversity (Fensham 1995). As for mesic rainforest, dry rainforest is characterised by a closed canopy of mixed species, lack of ground fuels and the prevalence of vines and epiphytes (Fensham 1995). Dry rainforest communities have a much higher proportion of deciduous and semi-deciduous species (Gillison 1987) but are ecologically similar to mesic rainforest in relation to fire sensitivity and suppression (Fensham 1995), achieved by shading out potential ground fuel and the creation of a cool, moist microclimate (Russell-Smith & Setterfield 2006; Ondei *et al.* 2016).

In a flammable landscape dominated by savanna, dry rainforest predominantly occurs in areas which are topographically fire protected or where a rocky substrate prevents fuel load accumulation (Russell-Smith 1991; Fensham 1995). This sensitivity however, does not mean they are unable to survive individual fires, with basal and aerial resprouting observed in some species (Ondei *et al.* 2016), nor does it preclude expansion into savanna ecosystems with fire protection (Fensham & Butler 2004).

The paper aims to develop an understanding of the distribution and ecology of the newly described species, in order to review the threat status of the species using IUCN (2017) Red List criteria.

Taxonomy of the genus *Brachychiton*

Brachychiton is characterised by woody dehiscent cymbiform follicles and can be separated from the related genus *Sterculia* L. by its hirsute exotestas which remain in the follicle after the seeds are dispersed (Guymer 1988). Distinguishing characters at the subgeneric and species level include flower colour and size, perianth shape, androgynophore dimensions, inflorescence characteristics, follicle shape and size, indumentum characteristics, nectary characteristics, and leaf blade shape and size. Most species in the genus exhibit variation in leaf shapes at different life and seasonal stages.

Brachychiton comprises five sections (Guymer 1988), consisting of *B.* section *Oxystele* Guymer (two species), *B.* section *Poecilodermis* Endl. (three species), *B.* section *Delabechea* (Mitchell ex Lindley) Guymer (two species), *B.* section *Trichosiphon* (Schott & Endl.) Endl. (four species) and *B.* section *Brachychiton* (25 species). This tally includes the recently described *B. chrysocarpus* Cowie & Guymer (Cowie & Guymer 2014), the new species described here and another three undescribed species known by informal names.

Materials and methods

Morphological description

The undescribed *Brachychiton* species was described using previously defined characters (Guymer 1988) based on specimens from the Queensland Herbarium, and supplemented by field collection and observation. The most morphologically similar species were identified and distinguishing characteristics established.

Survey for extent of occurrence

This was achieved by mapping the distribution of potential suitable habitat, searching for populations, assessing the size and demographics of the known populations, identifying distribution and structural variation between habitats, and evaluating possible threats.

In order to search for further populations all patches of dry rainforest were mapped within 50 km of the original site, excluding areas with greater than 900 mm of annual precipitation, using 2.5 m SPOT imagery available through World Imagery (http://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9) at a scale of 1:100 000 with a minimum patch size of 0.1 ha. Dry rainforest is characterised by a diverse tree layer and low grass cover and can be identified from satellite imagery using combinations of closed canopy, heterogeneous canopy texture and exposed rock. The patches of rainforest with greater than 900 mm rainfall were excluded because it has been established that the floristic composition of rainforest is strongly related to mean annual rainfall (Webb *et al.* 1984; Fensham 1995). On this basis it was assumed that search effort for a dry season deciduous tree is best expended in rainforest of relatively low rainfall areas. Within the search area, 53 patches were surveyed to search for the target species with 25 surveys conducted in 1993 and 28 in 2017.

Population surveys

The sites where the target species was located were mapped at 1:4000 to differentiate dry rainforest habitat (devoid of grass), boulder fields devoid of vegetation and savanna (grassy) (**Fig. 1**).

In March 2017, 6 m wide plots with variable length were randomly distributed within the dry rainforest and savanna (greater than 1% grass cover) within the populations. Grass cover was determined by counting intercepts of grass (assessed as minimum convex polygons around tussocks) at 1 m intervals along the centre of the plot. In each plot individuals of *B. guymeri* were also counted and assigned to size categories: < 0.5 m tall; 0.5–2 m tall; > 2 m tall, < 5 cm DBH; > 2 m tall, > 5cm DBH.

Mean and standard error densities were determined for each size category within the dry rainforest and savanna types at both sites. The mean values were multiplied by the habitat area to estimate the total number of individuals at each site.

The fire history of the two sites was obtained from the landholders. There was no record of any fire recently at the Blackwall Range site, with fire breaks established on either side of the hill on which it is located. The Aureole population was subject to a fire in 2015, 2–3 years before the survey was conducted.

The potential impact of fire was assessed by evaluating the differences in the sized-class structure of the stands between dry rainforest (fire protected) and savanna (not fire protected).

Extent of occurrence (EOO) and Area of occupancy (AOO) were calculated according to the IUCN recommendations (IUCN Standards and Petitions Subcommittee 2017).

Germination

Seeds collected from the target species in the field were germinated at the Queensland Herbarium in Brisbane, Australia. Sterilised 5 cm deep seed trays were filled with perlite, with a small amount of peat moss added. Seeds were evenly dispersed, and gently depressed to a depth of *c.* 0.5 cm and the trays lightly topped with vermiculite.

Results

Morphological description

Among the 32 previously described species of *Brachychiton*, six species from the section *Brachychiton* with morphological similarities to the undescribed *Brachychiton* species (< 5 m tall; **Fig. 2A**) were selected for comparison (**Table 1**). *B. guymeri* shares a multi-stemmed habit (**Fig. 2A**) with three other species (**Table 1**). All six of the shrub-form species have a 1:1 ratio between length and width of leaves, whereas *B. guymeri* has leaves on average 1.5 times longer than they are wide (**Fig. 3**). *B. guymeri* tends to have singular flowers, or occasionally small inflorescences of two or three flowers (**Fig. 2B**), compared to related species with inflorescences containing at least three, but usually 7–30 flowers. *B. guymeri* has smooth, glabrous follicles (**Fig. 2C**) compared to *B. chrysocarpus*, *B. bidwillii* Hook., *B. megaphyllus* Guymer and *B. multicaulis* Guymer with dense hair covering the outer surface, and *B. multicaulis* and *B. tuberculatus* (W.Fitzg.) Guymer having a tuberculate surface. *Brachychiton vitifolius* (F.M.Bailey) Guymer can be distinguished by its distinctly impressed adaxial veins and sparse indumentum, compared to the raised veins and dense indumentum of *B. guymeri*. Of the shrub species only *B. bidwillii*, *B. guymeri* and *B. vitifolius* occur in Queensland.

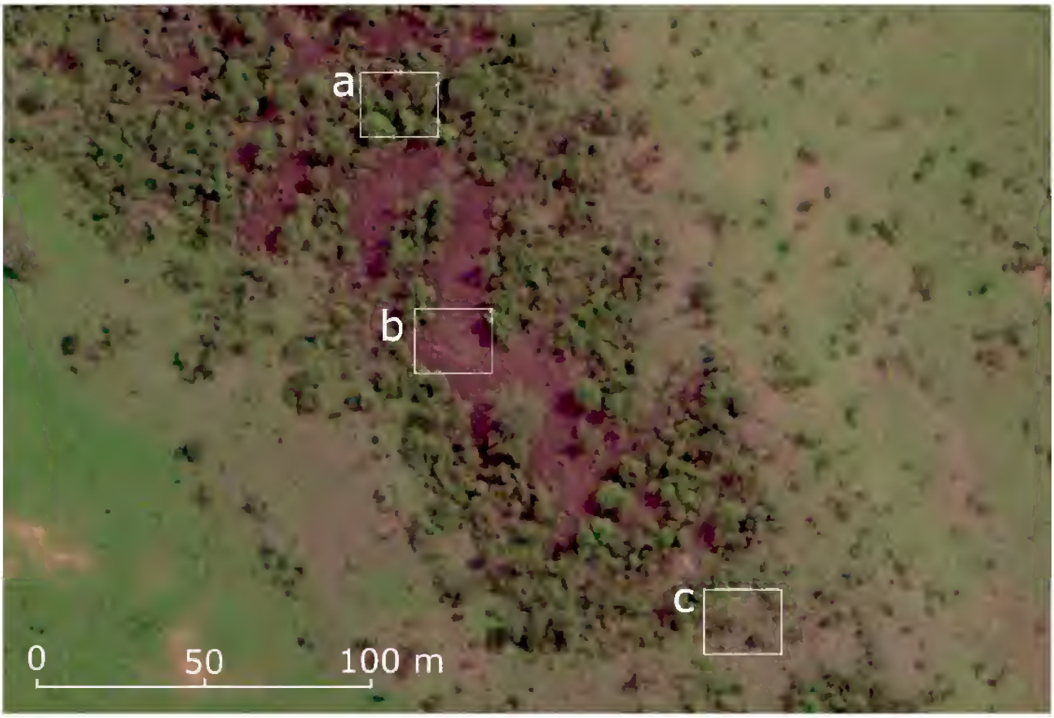

Fig. 1. The three types of habitat that were mapped at the sites where ***Brachychiton guymeri*** occurs. A dry rainforest habitat, B boulder field devoid of vegetation, C grassy vegetation.

Taxonomy

Brachychiton guymeri J.A.Bever., Fensham & P.I.Forst. **sp. nov.** Similar to *B. bidwillii*, but differing in the follicle exterior being near glabrous with a dark brown surface (versus khaki stellate-scabridulous outside), singular flowers (versus ramal inflorescences, mostly botryoids, ultimate branches usually triads, 7–12(–35) flowered), non-protruding androgynophores (versus androgynophores protruding above tubular opening), white to cream stigmas (versus pink) and floral tube interior densely stellate-hirsute (versus glabrous or occasionally with scattered stellate hairs). **Typus:** Queensland. South Kennedy District: Exmoor, 6 June 1996, *P.I. Forster PIF19190 & M.C. Tucker* (holo: BRI [AQ0603172 comprising 3 sheets, carpological and spirit samples]; iso: CNS, K, L, MEL, NSW *distribuendi*).

Brachychiton sp. (Blackwall Range R.J. Fensham 971); Guymer (2017).

Shrub or *tree* to 6 m, single or multi-stemmed (especially regrowth), deciduous. Fissured bark, dark to light grey. Branchlets 1.2–2.2 mm diameter, dense stellate-puberulent. *Leaves* ovate, entire or 3 lobed, 2.2–8.4 cm long, 0.8–6 cm wide, lobes 1–4 cm long; apices obtuse, occasionally retuse, acute, bases shallowly cordate to rounded; mid-dense stellate-hirtellous above and below, with glandular hairs between veins, adaxial veins dense stellate-hirtellous, abaxial veins dense pubescent. *Stipules c.* 3.5 mm long, dense stellate-puberulent. *Inflorescences* unknown, flowers only observed singularly. *Bracts* caducous (*n.v.*); pedicels *c.* 7 mm long. *Perianth* tubular-campanulate, 2.4–3.3 mm long, 2.3–3 mm diameter, shortly 5-lobed for *c.* 1/5 of its length, dark pink to

Table 1. Some characters used to distinguish *Brachychiton guymeri* from other closely related *Brachychiton* species, limited to those which form shrub habits. Summarised from Guymer (1988) and Cowie & Guymer (2014).

Character	*B. guymeri*	*B. bidwillii*	*B. vitifolius*	*B. megaphyllus*	*B. multicaulis*	*B. tuberculatus*	*B. chrysocarpus*
Multi-stemmed habit	Yes	Yes	Yes	No	Yes	No	No
Size ratio of leaf lamina (Length:width)	3:2	1:1	1:1	1:1	1:1	1:1	1:1
Flowers per inflorescence	1 (rarely 2+)	7–12(–35)	8–20	(8–)10–30	7–30	3–7	~24
Perianth exterior indumentum	stellate puberulent	stellate hirtellous	stellate and glandular tomentose	stellate hirtellous	tomentose or hirtellous	stellate hirtellous	dense, stellate, 0.7–1.1 mm
Perianth interior indumentum	stellate hirsute	glabrous, lobes stellate tomentose	sparsely glandular puberulent	stellate tomentose	stellate tomentose	stellate hirtellous	dense, stellate, 0.7–1.1 mm
Stigma colour	white to cream	pink	pink	cream or red	cream to orange-red	cream or red	cream
Follicle exterior surface	dark brown glabrous	khaki stellate-scabridulous	sparsely stellate hirtellous, glabrescent	densely yellow-brown stellate-hirtellous	densely brown stellate-hirtellous	brown stellate hirtellous outside, glabrescent, tuberculate	golden to dark brown densely pubescent
Multi-stemmed habit	Yes	Yes	Yes	No	Yes	No	No

red, occasionally with white, green at base of exterior, white to green interior base, induplicate areas pink; mid-dense to dense at base puberulent exterior, stellate hirsute interior; lobes semi-elliptic to elliptic, obtuse mucronate, recurved. *Nectaries* distinct, 10, 2 opposite each perianth lobe. *Male flowers*: androgynophore white, *c.* 1.8 mm long, obclavate, singular hairs along upper to densely stellate-hirsute base, fertile zone *c.* 4 mm long, 20 stamens, anthers *c.* 2 mm long. *Female flowers*: apparently of similar dimensions. *Follicles* ellipsoid, stipitate, rostrate, 6–9 cm long, 2–4 cm wide, dark brown, glabrous exterior, interior densely stellate-hirsute; pericarp 1.5–3 mm thick; stipes twisted, 15–26(–30) mm long, 4–7.5 mm diameter; apices triangular, arcuate, acute, erect or incurved, occasionally slightly recurved 6–11(–15) mm long. *Seeds c.* 14 per follicle, oblong-ovoid, 8.6–12 mm length, 4–9.5 mm diameter. Seedlings with cryptocotylar germination. **Figs. 1A–F.**

***Additional specimens examined*: Queensland.** South Kennedy District: SE of Mount Leslie, Dec 1992, *Fensham 444* (BRI); Blackwall Range, Exmoor, Aug 1993, *Fensham 971* (AD, BISH, BRI, CANB, DNA, K, L, MEL, NSW); Exmoor, Jun 1996, *Forster PIF19192 & Tucker* (BRI). Blackwall Ranges, Exmoor, Sep 2003, *Dennis 104* (BRI); Exmoor, S of Collinsville, Mar 2017, *Fensham 6592* (BRI); *ibid*, Mar 2017, *Fensham 6606* (BRI). Cultivated. Moreton District: Cooroy ex ‘Exmoor’, Dec 2014, *Tucker s.n.* (BRI [AQ0839498]).

***Distribution and habitat*:** *Brachychiton guymeri* is known from two locations about 10 km apart, approximately 60 km southeast of Collinsville in the South Kennedy district.

The main known population (Blackwall Range) of *B. guymeri* occurs in fragmented dry rainforest (semi-evergreen vine-thicket) on a granodiorite boulder field with little to no surface soil. It also extends into the adjoining grassy woodland habitat that is less rocky. The second population (Aureole) occurs on a mixture of granodiorite and sandstone that is also grassy. Both sites receive about 680 mm mean annual rainfall.

Brachychiton guymeri occurs as a locally common tree with other species of dry rainforest including *B. australis* (Schott & Endl.) A.Terracc. Unlike *B. australis* the species also occurs in adjacent eucalypt woodland. Other co-occurring dry rainforest species include *Abutilon auritum* (Wall. ex Link) Sweet, *A. micropetalum* Benth., *Alyxia ruscifolia* R.Br., *Lysiphyllum hookeri* (F.Muell.) Pedley, *Gyrocarpus americanus* Jacq., and *Terminalia aridicola* Domin. The woodland includes *Eucalyptus crebra* F.Muell., *Corymbia erythropholia* (Blakely) K.D.Hill & L.A.S.Johnson, *Eucalyptus melanophloia* F.Muell. and a mixture of grasses including introduced buffel grass (*Cenchrus ciliaris* L.).

***Phenology*:** Flowering period June to December (?); Fruiting December to March. Deciduous during dry season (~August to December).

***Notes*:** We posit that *Brachychiton* guymeri is morphologically most similar to *B. bidwillii* as diagnosed above. The species can also be clearly separated from *B. vitifolius* by raised adaxial veins (versus distinctly impressed), significantly smaller leaves 2.2–8.4 cm long, 0.8–6 cm wide (versus 12–19 cm long, 14–21 cm wide), singular flowers (versus 8–20 flowers per inflorescence), perianth interior stellate-hirsute (versus sparsely glandular-puberulent) and larger follicles 6–9 cm long, 2–4 cm wide (versus 3–6 cm long, 2–3 cm wide).

In the limited molecular analyses for this species presented by Carter (2011), *Brachychiton guymeri* showed no difference from *B. bidwillii* based on chloroplast data from four regions. Unfortunately Carter (2011) was unsuccessful in sequencing the nuclear G3*pdh* region for the species. While molecular support for *B. guymeri* remains equivocal at this point, the morphological differences are distinct. Our speciation hypothesis is that *B. guymeri* represents an allopatric speciation event with *B. bidwillii* as the sister species or as part of an ancestral lineage.

Three main scenarios can be applied to this speciation hypothesis for *Brachychition guymeri*. These scenarios are strongly influenced by the extant occurrence of both species and how they relate to proposed

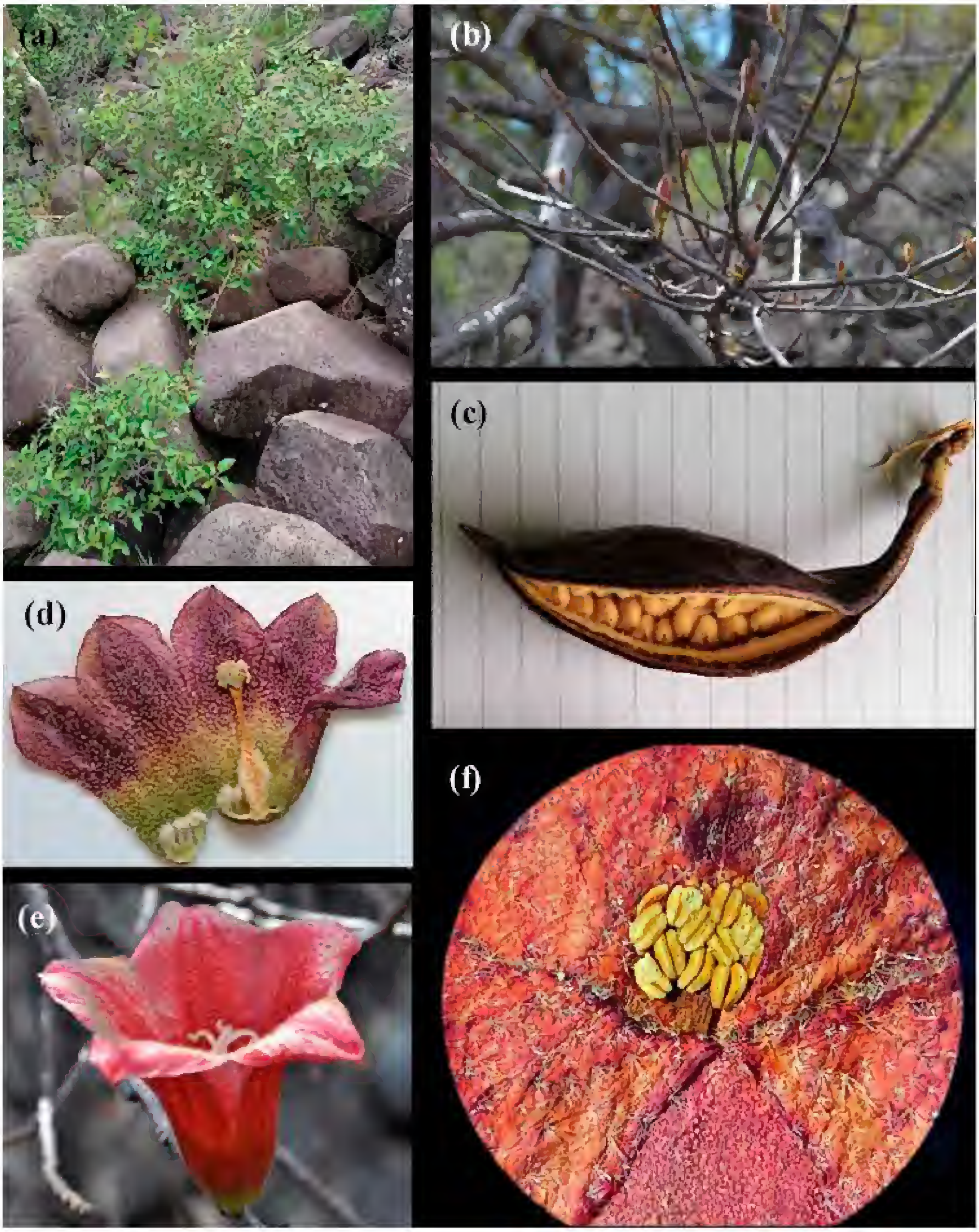

Fig. 2. ***Brachychiton guymeri.*** A. species habit. B. infloresence composed of single axillary flower. C. woody dehiscent cymbiform follicle with intact exotesta. D. male flower. E. female flower. F. variations in indumentum on interior and exterior (bottom centre) of perianth. All from the Blackwall Range population (*Fensham 6592*, BRI)

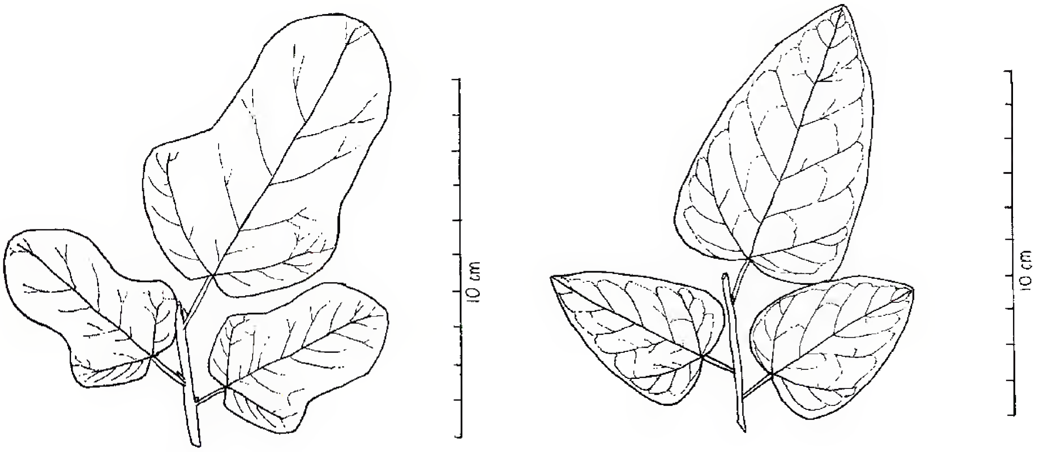

Fig. 3. Leaf shapes of ***Brachychiton guymeri***. The most typical form is on the left. The top leaf represents the maximum leaf length with appropriate dimensions; the left leaf is the mean dimensions; and the right leaf is the median dimensions. All from the Blackwall Range population (*Fensham 6606*, BRI).

biogeographic gaps in eastern Queensland (Bryant & Krosch 2016). While *B. guymeri* has a very small and defined extant area of occurrence, the situation with *B. bidwillii* is more complex. *Brachychiton bidwillii* occurs in two population centres, a northern population centre that is very small and restricted entirely to Magnetic Island offshore from Townsville (north of the Burdekin Gap), and a southern population centre comprising numerous subpopulations south of the St Lawrence Gap from Shoalwater Bay south to Boonah. In terms of the Bryant & Krosch (2016) biogeographic barriers, *B. guymeri* is quite unusual as it is in the area south of the Burdekin Gap and north of the St Lawrence Gap, well separated from *B. bidwillii* by over 200 km to the north and over 250 km to the south.

(Scenario 1) Model I of Levin (2000), *viz*. vicariant speciation, requiring local adaption to the unique habitat formed by the granodiorite outcrop. This scenario would require populations of *B. bidwillii* to be not markedly disjunct.

(Scenario 2) Model II of Levin (2000), *viz*. peripatic speciation, would require locally dispersed populations diverging from relatively nearby populations of *B. bidwillii*.

(Scenario 3) Model III of Levin (2000), *viz*. disjunct speciation, divergence following long range dispersal or from remnant populations of a once more widely distributed *B. bidwillii* that has now retreated beyond the above biogeographic barriers.

Given the considerable distance between populations of *B. guymeri* and *B. bidwillii*, the third scenario of disjunct speciation is putatively the most likely.

The observed rarity of *Brachychiton guymeri*, yet abundance of potentially suitable habitat (see discussion below), indicates a number of possibilities for this species in terms of its existence in space and time (Levin 2000). Either this is a species near to the start of its existence that has only recently managed to disperse to a second population, or a species near the end that is now restricted to refugia. The broad availability of habitat in the local area tends to favour the first possibility.

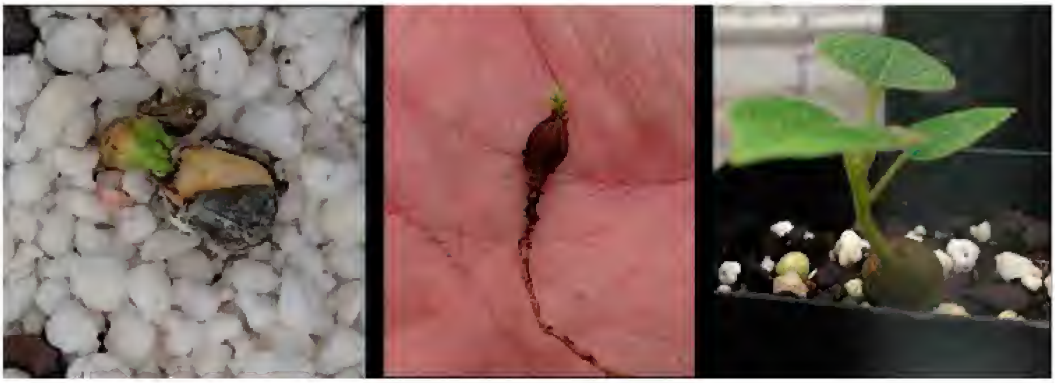

Fig. 4. ***Brachychiton guymeri*** germination and development of lignotuber. Germinating seed without release of cotyledons (left); lignotuber formed prior to leaf development (centre); stem and leaves emanating from lignotuber (right).

***Conservation status*:** *Brachychiton guymeri* (as *B.* sp. (Blackwall Range R.J. Fensham 971) is currently listed as **Endangered** under the Queensland *Nature Conservation Act 1992*, but we recommend amending the status to **Vulnerable** (see below).

Survey for extent of occurrence

Within the surveyed area of approximately 548,000 ha, 3111 ha or 0.57% was mapped as dry rainforest (**Fig. 5A**; **Table 2**). The dry rainforest consisted of 764 patches, 82.2% of which were smaller than 5 ha, although 58.8% of the total area of dry rainforest was made up of patches larger than 5 ha (**Table 2**).

Fifty-three dry rainforest patches were surveyed for the presence of *Brachychiton guymeri* but no additional populations were located (**Fig. 5B**). The total area searched was 770 ha or 24.7% of the total mapped area of dry rainforest in the survey area (**Table 2**). The majority of patches surveyed in the current research were less than 10 km away from either one of the known populations (**Fig. 5B**).

Population survey

The total habitat area was 34.3 ha, with 10.6 ha of dry rainforest habitat at the Blackwall Range site, 21.8 ha in the surrounding grass dominated area, and the remaining 1.9 ha at the Aureole site (**Fig. 6**). The extent of occurrence was 23 km^2 and the area of occupancy based on habitat maps (**Fig. 6**) was 39 ha, therefore 4 km^2 grid cells or a total of 1200 ha using IUCN guidelines (IUCN Standards and Petitions Subcommittee 2017).

The total population of the target species was estimated to be 11000±1900. Of this, 56% were located in the dry rainforest habitat at the original site. The savanna of the primary site contained 11%, while the Aureole savanna population comprised the remaining 33%.

The population size structure was fairly evenly distributed in the dry rainforest at Blackwall Range (**Fig. 7**), and the low density of large trees (> 5 cm dbh) is indicative of the generally shrub-sized stature of *B. guymeri*. In the savanna surrounding the dry rainforest, no individuals under 50 cm were recorded, and other sized classes were at much lower densities than within the dry rainforest. The Aureole savanna population had very high densities of individual less than 2 m high, and low densities of larger individuals (**Fig. 7**).

Discussion

The analysis of the stand structure for *Brachychiton guymeri* revealed a relatively high density of smaller individuals within the dry rainforest population at Blackwall Range. This suggests a stable, self-sustaining population. The presence of medium-sized individuals indicates that *B. guymeri* can establish in relatively fire-prone savanna environments while the absence of small sized-class individuals indicates there has been no recent recruitment or perhaps indicates a long absence of fire, such that young shoots regenerating from coppice after 'top-kill' by fire are absent. The long-term absence of fire at this site is consistent with the recollections of the landholders who have no memory of fire in this area for at least 20 years (E. Comerford pers. comm.).

The Aureole population by contrast has very few mature trees, but a prolific number of smaller individuals. This pulse of vegetative regeneration is likely a result of a basal resprouting after a fire that occurred in 2015. *Brachychiton guymeri* can occupy both fire-protected dry rainforest and fire-prone savanna. *B. guymeri* can regenerate from lignotubers after fire and is much more fire tolerant than its congener *B. australis* that is extremely fire sensitive (Fensham *et al.* 2003).

Brachychiton guymeri appears to have a very limited geographic distribution with two known populations *c.* 10 km apart. While only a small proportion of the dry rainforest within the region where *B. guymeri* occurs has been surveyed (**Fig. 5; Table 2**), it was found to be absent from 51 nearby patches. Dry rainforest generally exhibits a high degree of floristic homogeneity, with 87% of species found in inland dry rainforest also occurring within 1 km of the coast (Fensham 1995). These communities are predominantly made up of generalists with broad geographic ranges and species with restricted distributions are unusual amongst the dry rainforest flora. This homogeneity of the flora is consistent with species that are readily dispersed, predominantly by birds and bats (Russell-Smith & Lee 1992). The co-occurring congener *Brachychiton australis* is a widespread tree so the rarity of *B. guymeri* is puzzling as it is clearly more fire tolerant than *B. australis.*

Threat status

The criteria for assessing the conservation status of species is strongly dependant on assessing or predicting a decline in population such that it is at risk of extinction, and the influence of threatening processes that may cause such a decline (IUCN 2001).

There are no immediate threats to *Brachychiton guymeri.* By virtue of its location on rocky slopes, it faces little threat of disturbance by domestic and feral species, and the habitat is not suitable for clearing for agricultural purposes (Fensham 1996). The encroachment of introduced grass species into the margins of dry rainforest habitat at these sites is limited by the lack of exposed soil.

Table 2. Summary data on dry rainforest within 50 km of the known populations of Brachychiton guymeri in areas with less than 900 mm mean annual rainfall

	Number of patches	Area	Proportion of total study area	Proportion of total dry rainforest area
Total dry rainforest area	764	3111 ha	0.57 %	-
patches > 5 ha	136	2140 ha	0.39 %	68.8%
Surveyed	53	770 ha	0.14 %	24.8 %

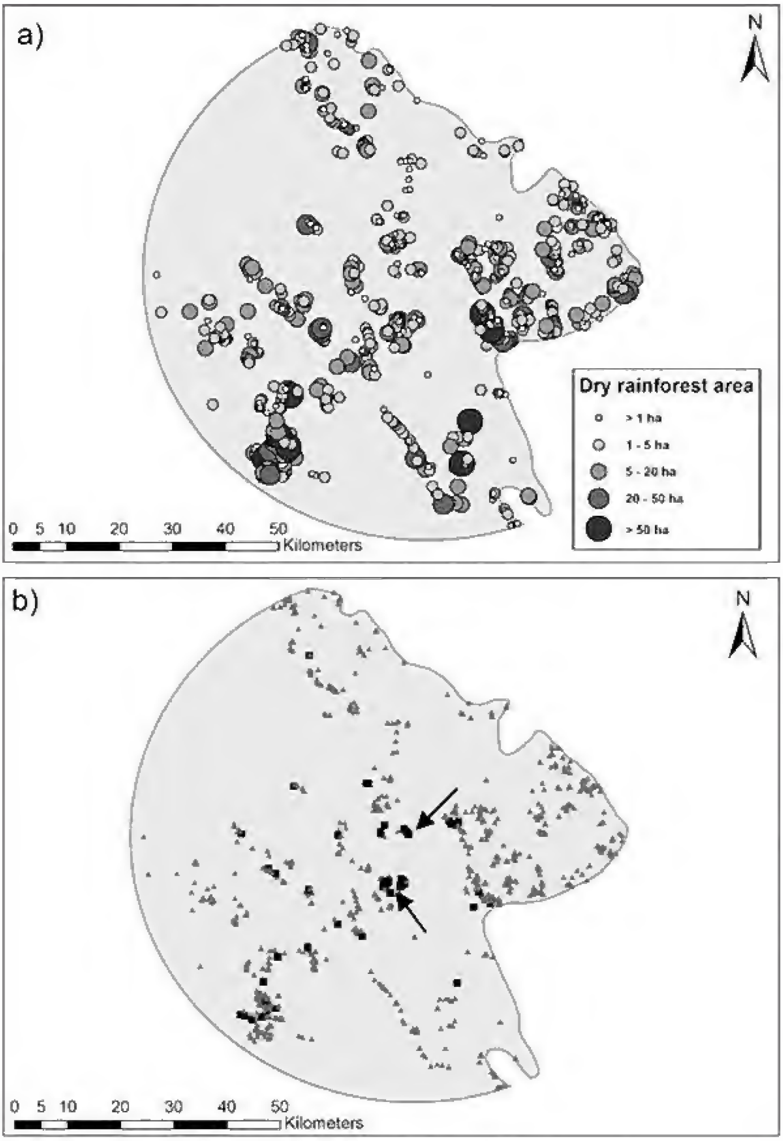
a)
N
Dry rainforest area
> 1 ha
1 - 5 ha
5 - 20 ha
20 - 50 ha
> 50 ha
0 5 10 20 30 40 50
Kilometers
b)
N
0 5 10 20 30 40 50
Kilometers

Fig. 5. The location of dry rainforest patches within 50 km of the largest population in areas with less than 900 mm rainfall, a) according to their area; b) with surveyed sites (black sqaures) and unsurveyed sites (grey triangles). The location of the Blackwall Range population (north arrow) and Aureole population (south arrow) is indicated on b).

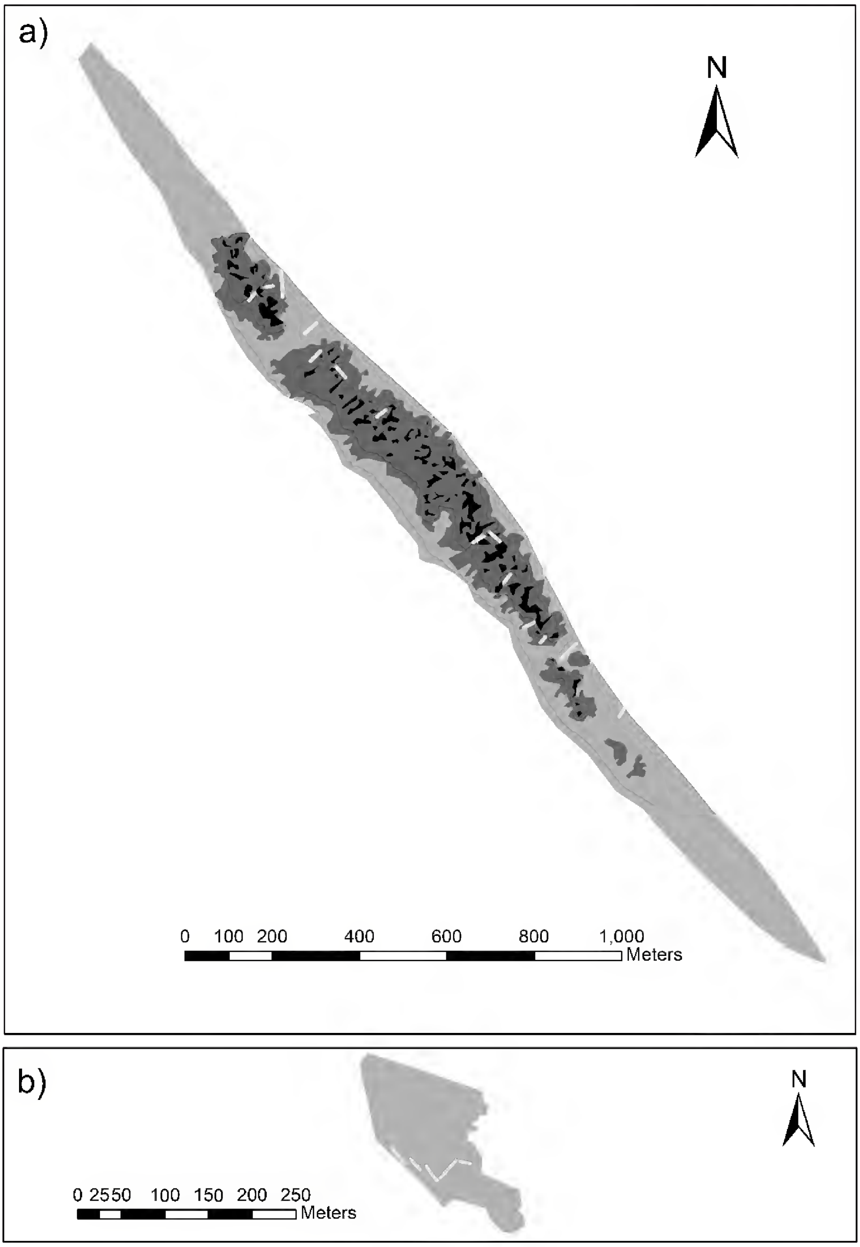
a)
N
0 100 200 400 600 800 1,000
Meters
b)
N
0 2550 100 150 200 250
Meters

Fig. 6. Maps of population extent at the a) Blackwall Range population; and b) the Aureole population. Skeletal boulderfield devoid of vegetation (black), dry rainforest (dark grey), grassy vegetation (light grey). The position and length of the surveyed transects are shown as white lines

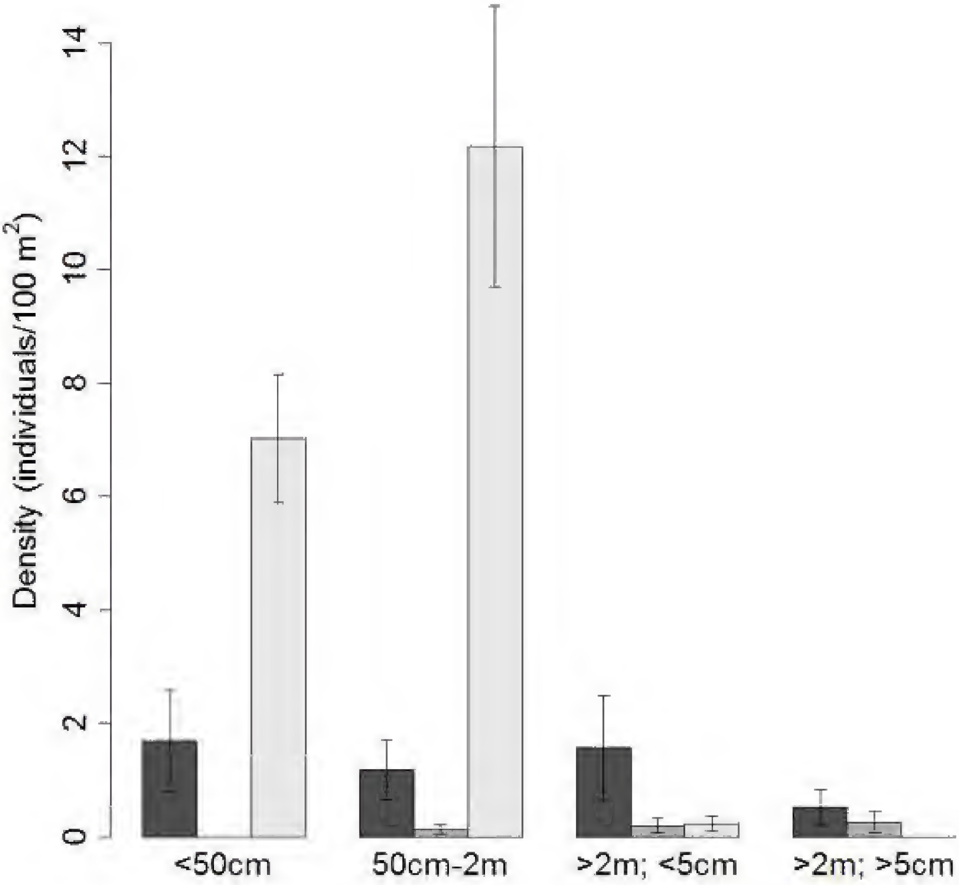

Fig. 7. Mean density (with standard error bars) of each size category of ***Brachychiton guymeri*** in dry rainforest (dark grey) and savanna (medium grey) at the Blackwall Range and Aureole (light grey) sites.

According to the most recent IUCN guidelines (IUCN Standards and Petitions Subcommittee 2017) 'It must be emphasized that the restricted area of occupancy under criterion D2 is defined such that the population is prone to the effects of human activities or stochastic events in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period (e.g., within one or two generations after the threatening event occurs).' It is conceivable that either of the populations could be subject to extirpation by a development project such as a mine. Gold deposits are associated with the granodiorite (Hecate Granite on 1:250 000 Geological Series Map) and the sediments include coal deposits (Paine & Cameron 1972).

The species' known habitat is regulated vegetation and protected from clearing under the Queensland *Vegetation Management Act 1999* and its essential habitat provisions (https://researchdata.ands.org.au/vegetation-management-essential-version-418/562955?source=suggested_datasets). In addition, known individual plants are protected under Queensland's Protected Flora Survey Trigger map (https://environment.des.qld.gov.au/licences-permits/plants-animals/protected-plants/map-request.php.)

On the basis of such a threat in the future we recommend a revised listing of *Brachychiton guymeri* as **Vulnerable** under Criterion D: 'Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.'

***Etymology*:** Named for Dr Gordon Paul Guymer, author of the seminal work on the genus and Director of the Queensland Herbarium since 1991.

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We thank Boris Laffineur for his assistance in spatial matters and logistics, Esther Haskell, Patrick Fahey, Gabrielle Lebbink and Gary Reed for their feedback and field assistance, Rosie Matters and Gordon Guymer for assistance and advice with regards to growing the focus species, and the Comerford family for generously hosting us during field work.

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Three new species of *Corchorus* L. and *Grewia* L. (Sparmanniaceae / Malvaceae subfamily *Grewioideae*) from northern Australia, an earlier name in *Grewia*, and recircumscription of *Triumfetta kenneallyi* Halford

Russell L. Barrett

Summary

Barrett, R.L. (2019). Three new species of *Corchorus* L. and *Grewia* L. (Sparmanniaceae / Malvaceae subfamily *Grewioideae*) from northern Australia, an earlier name in *Grewia*, and recircumscription of *Triumfetta kenneallyi* Halford. ***Austrobaileya*** **10(3): 458–472.** *Corchorus drysdalensis* R.L.Barrett is described as a new species from the Drysdale River National Park. *Grewia pindanica* R.L.Barrett is described as a new species from the Dampier Peninsula. *Grewia savannicola* R.L.Barrett is described as a new species; it was previously confused with the Asian *G. retusifolia* Kurz. *Grewia guazumifolia* Juss. is an earlier name for *G. glabra* Blume, and considered distinct from *G. multiflora* Juss. The circumscription of *Triumfetta kenneallyi* Halford is reassessed based on recent collections and a new description is presented. The five species are all illustrated.

Key Words: Malvaceae; Grewioideae; Sparmanniaceae; *Corchorus*; *Grewia*; *Triumfetta*; *Corchorus drysdalensis*; *Grewia pindanica*; *Grewia savannicola*; *Grewia retusifolia*; *Grewia guazumifolia*; *Grewia multiflora*; *Triumfetta kenneallyi*; Australia flora; Western Australia flora; Northern Territory flora; Queensland flora; new species; morphology

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Introduction

This paper formally names a new species of *Corchorus* L. from the Kimberley region of Western Australia. Taxonomy of the stellate-haired species of *Corchorus* in north-west Australia is generally quite complex, with considerable variation in a number of taxa (see Halford 2004). The species named here is sufficiently distinct from all previously named taxa to warrant description at specific rank. *Corchorus drysdalensis* R.L.Barrett is only known from the type collection from Drysdale River National Park (NP) in the north Kimberley and is of conservation priority. *Corchorus drysdalensis* is unusual for its sparsely hairy (glabrescent) leaves and decumbent habit. Examination of specimens of *C. pumilio* R.Br. ex Benth. and *C. sidoides* F.Muell. held at PERTH found no additional collections, despite previous flora surveys in Drysdale River NP (Kabay & Burbidge 1977).

A new species of *Grewia* L. is described from pindan vegetation on the Dampier Peninsula as *G. pindanica* R.L.Barrett. First recognised as distinct from *G. retusifolia* Kurz *s. lat.* during surveys in the vicinity of James Price Point north of Broome in 2011, it is now known for a number of relatively localised areas on the Dampier Peninsula. Specimens of this taxon were included under *G. retusifolia* by both Rye (1992) and Kenneally *et al.* (1996). While studying *G. retusifolia s. lat.*, it was determined that this name applies to an Asian shrub or small tree, distinct from the small lignotuberous shrub common across northern Australia and extending to southern Papua New Guinea. No name at species rank has been located for the Australian taxon, so it is here described as *G. savannicola* R.L.Barrett.

David Halford (pers. comm.) suggested that *Grewia guazumifolia* Juss. may be an earlier name for *G. glabra* Blume. Examination of images of type specimens, and study of relevant literature on Asian

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Grewia has confirmed that this is correct, and the earlier name is taken up here.

Collections of a small *Triumfetta* L. located under rock overhangs on Doongan Station in 2009 and 2012 were initially considered to be a potential new species. Further examination of collections of *T. kenneallyi* Halford resulted in the conclusion that the new collections from Doongan Station represented a small form of that species with many measurements outside the ranges presented in the available description of that species (Halford 1997). Accordingly, a revised description of *T. kenneallyi* is presented here.

Materials and methods

Descriptions are based on dried herbarium specimens following the formats of Halford (1993, 1997, 2004). All taxa have been examined in the field by the author in Western Australia, with *G. savannicola* also observed in the Northern Territory and Queensland. Specimens have been examined at CANB, MEL, NSW and PERTH. Images of non-Australian type specimens have been examined on *JSTOR Plants* (https://plants.jstor.org), *Naturalis* (www.bioportal.naturalis.nl) and *Muséum national d'Histoire naturelle* (https://science.mnhn.fr) [all accessed Aug. 2018].

Conservation assessments follow Conservation Codes for Western Australian Flora based on information reflecting the number, distribution and size of known populations.

To produce Scanning Electron Microscope (SEM) images, dry material was mounted on stubs using double-sided or carbon tape with conductive carbon paint, coated with gold using an EMITECH K550X Sputter Coater and imaged at high vacuum and high voltage (15 KVa) using a Jeol JCM 6000 NeoScope bench-top SEM at Kings Park and Botanic Garden.

Taxonomy

1. Corchorus drysdalensis R.L.Barrett **sp. nov.** with affinity to *C. sidoides*, but differing by being a decumbent to spreading shrub to 20(–40) cm high and 80 cm across, mature indumentum sparse; leaf lamina strongly discolorous, surface distinctly visible above, dark green; sepals with stellate hairs 0.05–0.2 mm long; fruit 2 or 3-valved; apex scarsely attenuate, not orientated downward, indumentum sparse. **Typus:** Western Australia. Kimberley District: Drysdale River National Park [precise locality withheld for conservation reasons], 9 March 2014, *R.L. Barrett RLB 8878* (holo: PERTH; iso: BRI, CANB).

Subshrub to 0.2(–0.4) m high, to 0.8 m across; stems much branched, procumbent to spreading, reddish in colour; young shoots with very sparse translucent-white or pale ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts translucent-white or pale ferruginous, very sparse to moderately dense, comprised of stellate hairs. Stellate hairs sessile or shortly stipitate, 0.1–0.2(–0.4) mm across; stipes straight, to 0.1 mm long, white or ferruginous; rays firm to pliable, to 0.1(–0.2) mm long, translucent-white or pale ferruginous. Stipules subulate-linear, 1.5–2.6 mm long. Leaves with petioles 1.4–3.6 mm long; lamina narrowly oblong to oblong-elliptic, 5–31 mm long, 2.6–7.9 mm wide, l:w ratio 2–3.5:1, strongly discolorous, bright green above, sparsely hairy on both surfaces; base obtuse or rounded; margin often sinuose, shallowly serrate to serrulate; apex acute to rounded. Inflorescences umbellate, 2–5-flowered, leaf-opposed, solitary at upper nodes; peduncles 0.5–1.6 mm long; pedicels 1.1–2.3 mm long, spreading to erect in flower, erect to recurved in fruit; bracts subulate-linear to filiform-linear, 1.1–2.4 mm long. Flower buds obovoid, 1–1.4 mm across, not longitudinally ridged; apex acuminate-caudate with 5 erect caudae to 0.6 mm long. Sepals 5, not persistent, very narrowly obovate to almost lanceolate, 2.6–4.2 mm long, 0.4–0.7 mm wide; abaxial surface with a sparse to moderately dense indumentum of stellate hairs 0.05–0.2 mm long; adaxial surface glabrous or with scattered stellate hairs proximally; apex acute or acuminate-caudate, to 1.1 mm long. Petals 5; lamina narrowly obovate to obovate, 2.6–2.8 mm long, 1–1.2 mm wide, glabrous; claw 0.5–0.6

mm long, stellate-pubescent on margins. Androgynophore 0.1–0.2 mm long; annulus entire, 0.1–0.2 mm long, glabrous. Stamens 23–26, filaments 2.4–3.1 mm long. anthers 0.2–0.4 mm long. Ovary cylindrical, 0.3–0.4 mm across, densely stellate-villose, 2- or 3-locular, with 10–16 ovules in each locule; style 2.1–2.3 mm long. Fruits subcylindrical 15–34 mm long, 1–1.6 mm across, mostly 10–15 times longer than wide, spreading to erect, straight, curved or slightly twisted, circular in transverse section, slightly or markedly constricted between seeds, 2 or 3-valved; apex obtuse or attenuate, to 3.7 mm long, not orientated downward; indumentum sparse, stellate hairs to 0.1 mm long. Seeds compressed obovoid, 1.2–1.6 mm long. **Fig. 1.**

***Distribution and habitat*:** *Corchorus drysdalensis* is known only from the type location in the Drysdale River NP in the north Kimberley region of Western Australia where it was locally common, but specific to an interzone habitat along a low laterite breakaway parallel to a large creek. Plants grow in open savanna woodland on shallow sand over a lateritic hardpan, growing with *Acacia dunnii* (Maiden) Turrill, *A. nuperrima* Baker f., *Afrohybanthus aurantiacus* (F.Muell. ex Benth.) Flicker, *Cajanus* sp., *Corymbia latifolia* (F.Muell.) K.D.Hill & L.A.S.Johnson, *Eucalyptus tetrodonta* F.Muell., *Euphorbia* sp., *Glycine* sp., *Goodenia cravenii* R.L.Barrett & M.D.Barrett, *G. redacta* Carolin, *Grevillea microcarpa* Olde & Marriott, *Haemodorum* sp. aff. *flaviflorum* W.Fitzg., *Murdannia* sp. aff. *graminea* (R.Br.) G.Bruckn., *Polycarpaea* sp., *Solanum tudununggae* Symon, *Sorghum plumosum* (R.Br.) P.Beauv., *Spermacoce* sp., *Tephrosia* spp., *Triodia* sp. aff. *bynoei* (C.E.Hubb.) Lazarides, *T. claytonii* Lazarides and *Triumfetta* sp.

***Phenology*:** Flowering and fruiting known for March.

***Affinities*:** Using the key from Halford (2004), this taxon would key to *Corchorus sublatus* Halford on the basis of the fruit apex not usually oriented downward, and very short peduncles, but that species is an erect shrub to 1.5 m with a denser indumentum and has the fruit held erect. If the alternate fruit apex character is followed, then it keys best to *C. sidoides*, but not in all characters of lead 23 as the leaf epidermis is clearly visible.

Corchorus drysdalensis is similar in general appearance to *C. sidoides* with a low, spreading habit and somewhat sinuose fruit that are usually 2-valved (Halford 2004) and the two species are probably closely related. *C. drysdalensis* appears to be distinct from all subspecies of *C. sidoides* in the very sparse indumentum of shorter stellate hairs 0.1–0.2(–0.4) (versus to 0.5 or 2) mm across; leaves strongly discolorous, dark green above with the epidermis clearly visible; and sparsely hairy fruit that do not appear to have an attenuate apex that often points downward.

While *Corchorus sidoides* is a very morphologically variable species, with three subspecies recognised, *C. drysdalesnsis* can not readily be included within that variation. A large number of populations of *C. sidoides* subsp. *sidoides* and subsp. *vermicularis* have been examined in the field by the author across the Kimberley and Pilbara regions of Western Australia, including within Drysdale River NP. *Corchorus drysdalensis* differs from *C. sidoides* subsp. *sidoides* by the much sparser, finer indumentum, especially on the leaves and fruit.

Corchorus drysdalensis is more similar to *C. sidoides* subsp. *vermicularis* (F.Muell.) Halford in terms of the smaller fruit and sparse indumentum; however, the indumentum cover is even sparser than that subspecies. *C. drysdalensis* has young shoots with very sparse translucent-white or pale ferruginous (versus grey-white) indumentum. The leaf margins of *C. sidoides* subsp. *vermicularis* are also distinctive, commonly with well-spaced, tooth-like lobes or serrations.

The third subspecies, *Corchorus sidoides* subsp. *rostrisepalus* (Domin) Halford is usually an erect shrub. It does have smaller stellate hairs that the other subspecies, to 0.3 mm across, but at least those on young growth are distinctly ferruginous. It also has much larger leaves, 35–90 mm long, (5–)15–30 mm wide.

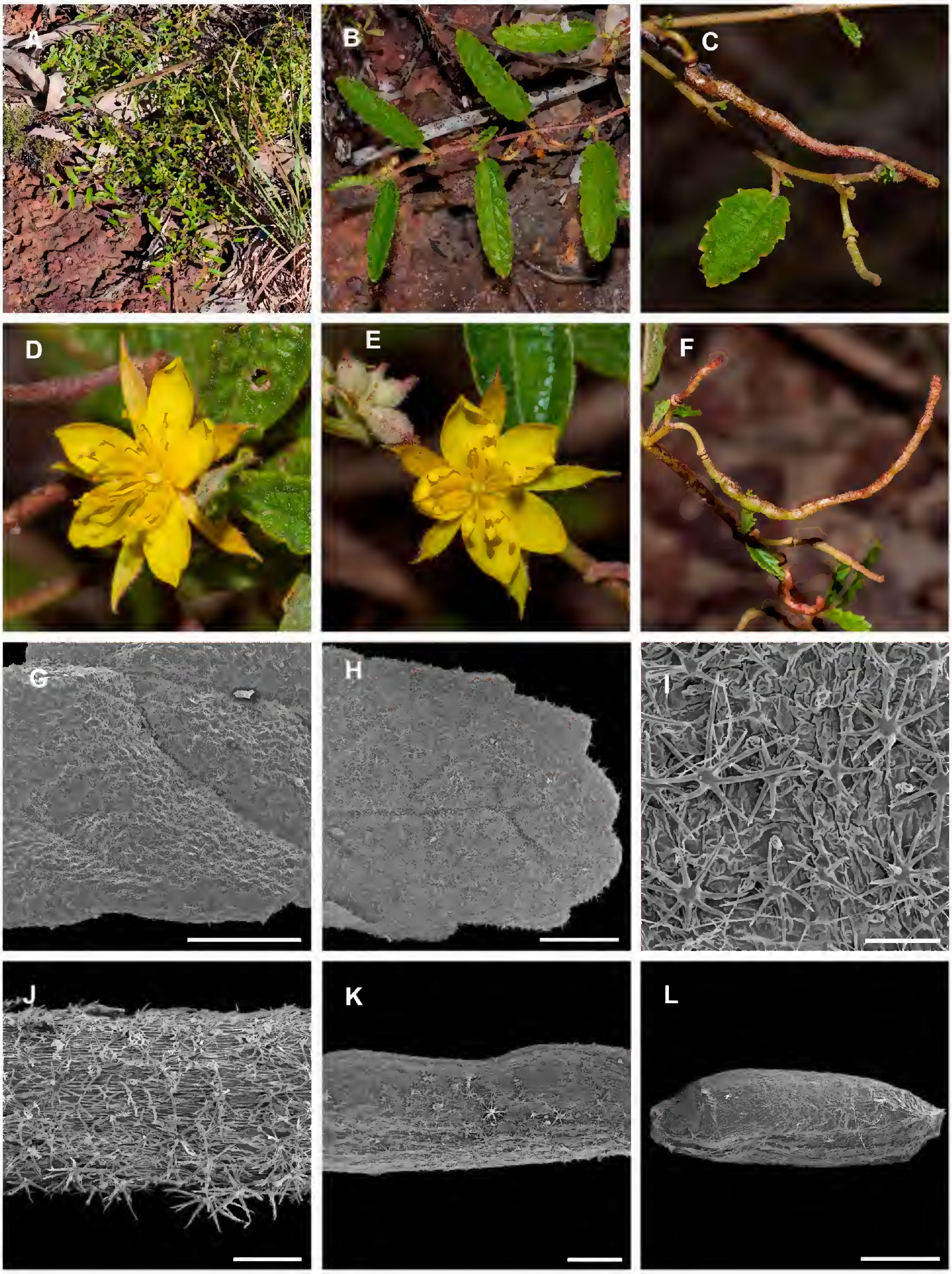

Fig. 1. ***Corchorus drysdalensis.*** A. habit. B. leafy branch with buds. C. leaf and fruit. D. flower. E. flower and buds. F. fruit. G. SEM of upper surface of mature leaf. H. SEM of upper surface of young leaf. I. SEM of indumentum on young leaf – note occasional cellular simple hairs among stellate hairs. J. SEM of stem indumentum. K. SEM of sparse indumentum on fruit. L. SEM of seed. Scale bars = 1 mm (G, H); 100 µm (I); 200 µm (J); 500 µm (K, L). Images from *Barrett RLB 8878* (PERTH). Photos: R.L. Barrett.

There is some superficial similarity of *C. drysdalensis* to *C.* sp. Fitzroy Crossing (A.J. Ewart s.n. PERTH 01526790), a larger, more openly branched subshrub endemic to the Fitzroy River basin which grows under riverine vegetation on sedimentary loam and can be distinguished by its pale grey-green (versus dark green) leaves with coarsely serrate (versus sinuose) margins and cuneate (versus obtuse or rounded) base; and sepals 2–2.6 (versus 2.6–4.2) mm long (S. Dillon pers. comm.).

Conservation status**:** *Corchorus drysdalensis* is to be listed as **Priority Two** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.). It is known to occur within Drysdale River NP.

Etymology**:** The specific epithet refers to the Drysdale River NP where this species was found. The vernacular name of 'Drysdale River Corchorus' is suggested.

2. Grewia guazumifolia Juss., *Ann. Mus. Natl. d'Hist. Nat.* 4: 89, pl. 48, fig. 3 (1804), [as '*guazumaefolia*']. **Type:** Indonesia. 'Inde' [Java], in 1799, *Lahaie s.n.* [*herb. A. de Jussieu 12555*] (holo: P-JU, image!).

Grewia glabra Blume, *Bijdr. Fl. Ned. Ind.* 3: 115 (1825), *non* Mast. (1874). **Type:** Indonesia. Java, *s.dat.*, *C.L. Blume* 68 (lecto: L 0397620/ Herb. Lugd. Bat. 908.253-1458 image!), *fide* Chung (2006: 17). **Probable isolectotypes:** Indonesia. Java, *C.L. Blume s.n.* (?isolecto: L 0064757/Herb. Lugd. Bat. 908.253-1301; L 0064758/ Herb. Lugd. Bat. 908.253-1490; L 0064760/ Herb. Lugd. Bat. 944.56-6; NY 00415417, U 0111074 [images seen for all]).

Grewia oblongifolia Blume, *Bijdr. Fl. Ned. Ind.* 3: 114 (1825). **Type:** Indonesia. [Java], *s.dat.*, *C.L. Blume s.n.* (lecto: L 0397618/Herb. Lugd. Bat. 951.341-895; isolecto: L 0397619/ Herb. Lugd. Bat. 951.341-896, *fide* Chung 2006: 17). **Syntypes:** Indonesia. Java, *s.dat.*, *C.L. Blume 59* (syn: L 0064812/ Herb. Lugd. Bat. 944.56-15); Java, *s.dat.*, *C.L. Blume 407* (syn: L 0064810/ Herb. Lugd. Bat. 944.56-10); Java, *s.dat.*, *C.L. Blume s.n.* (syn: L 0064806/ Herb. Lugd. Bat. 908.253-175); L 0064811/ Herb. Lugd. Bat. 944.56-11); Java, *s.dat.*, *C.G.C. Reinwardt s.n.* (syn: L 0064805/ Herb. Lugd. Bat. 908.253-147); Java, *s.dat.*, *H. Kuhl & J.C. van Hasselt s.n.* (L 0064809/ Herb. Lugd. Bat. 951.341-893); [images seen for all].

Grewia osmoxylon Ridl., *J. Straits Branch Roy. Asiat. Soc.* 45: 180 (1906). **Syntypes:** Australia. CHRISTMAS ISLAND: North East Point, October 1904, *H.N. Ridley 59* (syn: K 000686798); Rocky Point, 14 October 1904, *H.N. Ridley 61* (syn: K 000686797); Kagu Wangu, *s.dat.*, *C.W. Andrews 106* (syn: BM 000631000); [images seen for all]).

[*Grewia multiflora auct. non* Juss.: B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Region* 167, fig. 45b (1992); J. Puruntatameri *et al.*, *Tiwi Pl. & Animals* 56, pl. (2001). R.C.K. Chung, *Edinburgh J. Bot.* 62: 15, fig. 7 (2006), *p.p.* as to synonyms from Java].

[*Grewia laevigata auct. non* Vahl: C.W. Andrews, *Monogr. Christmas Is.* 174 (1900); D. Brandis, *Indian Trees* 97, fig. 47 (1906)].

Illustration**:** Du Puy & Telford (1993: fig. 14), as *G. glabra*.

Notes**:** Chung (2006) clarified the distinction of *Grewia laevigata* Vahl (confused by Phengklai 1993 and many earlier authors), but included *G. glabra* Blume under a broad concept of *G. multiflora* Juss. This was followed by Ya Tang *et al.* (2007). Daniel & Chandrabose (1993) included *G. glabra* under *G. serrulata* DC. Following study of type specimen images available on JSTOR Plants and through L and P, I agree with Halford (1993, pers. comm.) that while closely related, northern Australian and at least southern East Asian collections are distinct from *G. multiflora*, and the earliest name available for the taxon appears to be *G. guazumifolia* Juss. which is adopted here. Excellent images of *G. multiflora s. str.* can be found in *Co's Digital Flora of the Philippines* (www.philippineplants.org). The name *Grewia didyma* Roxb. ex G.Don from India has not been critically evaluated here and it is tentatively included under *G. multiflora* as designated by Chung (2006), but it may also belong under *G. guazumifolia*.

Grewia multiflora has more glossy leaves with more acute serrations, a courser stellate indumentum on the leaves, petioles and peduncles, a finer inflorescence with more slender peduncles, yellowish rather than white petals, and shorter staminal filaments relative to *G. guazumifolia*. Australian plants are illustrated in **Fig. 2.**

3. Grewia pindanica R.L.Barrett **sp. nov.** with affinity to *G. savannicola*, but differing by the following combination of characters: large shrub to 2 m high; juvenile leaves *c.* orbicular; flowers functionally unisexual male or bisexual; stigma lobes with small, blunt apical projections (obscure when dry). **Typus:** Western Australia. KIMBERLEY DISTRICT: north of Broome [precise locality withheld for conservation reasons], 1 May 2011, *R.L. Barrett, M. Henson, R. Graham & M. Stone RLB 7065* (holo: PERTH; iso: BRI, CANB, DNA, K, NSW).

[*Grewia retusifolia auct. non* Kurz; K.F. Kenneally *et al.*, *Broome & Beyond: Pl. & People Dampier Peninsula, Kimberley, West. Austral.* 193, pl. (1996)].

Erect to spreading shrub to 2 m high, with few to many stems arising from perennial woody rootstock, main stems to 8 mm diam. Young branchlets stellate-tomentulose with hairs of two size classes; older branchlets retaining short stellate hairs. Leaves obovate to elliptic-obovate, 6.5–9.5 cm long, 3–5.5 cm wide, sparsely stellate-puberulous above, densely greyish white stellate-tomentulose below, 3-nerved from the base; margin irregularly serrate; apex acute, sometimes shallowly 3-lobed; base obtuse; petioles 6–12 mm long, densely stellate-tomentulose. Juvenile leaves broader and shorter, *c.* orbicular, 20–40 mm long, 24–53 mm wide. Stipules linear, 2.2–3.2 mm long, stellate-tomentulose. Inflorescences axillary umbellate cymes; peduncles 3.5–7.2 mm long, 1–3 flowered, 1–3 cymes per axil; pedicels 2.1–9.2 mm long; bracts linear, 2–3 mm long, all parts stellate-tomentulose. Buds obloid, 3–4 mm long. Flowers functionally unisexual male, or bisexual. Sepals 4 or 5, narrowly elliptic-ovate, 4.3–5.6 mm long, 1.5–2 mm wide, white, densely stellate-pubescent outside, glabrous inside; apex acute. Petals 4 or 5, oblong, 2–3.2 mm long, 0.7–1 mm wide; white, mostly glabrous but with an arch of dense villous hairs spreading from the base, across the centre of the inside of each petal around the basal nectariferous gland which is 0.8–1.2 mm diameter, not or slightly wider than the base of the lamina; outside face of gland with dense, small papillae. Androgynophore angular, *c.* 2 mm long, glabrous in lower half, densely hairy in apical half, elongated above the node. Male flowers: stamens 16–40; filaments white, 3.5–5.4 mm long; ovary and style rudimentary. Bisexual flowers: stamens 20–32, remaining white and possibly non-functional, though some dehiscence has been observed; filaments white, 1.3–3.2 mm long; ovary globose, 1.5–2 mm diameter, strigose, 2-locular, 4 ovules per loculus; style stout, 2.3–4.1 mm long, glabrous; stigma with 3 or 4 broad lobes; lobes with small, blunt apical projections (obscure when dry). Fruit of 2 bilobed parts, 6.1–6.2 mm long, 10–11 mm wide, conspicuously 4-lobed or commonly 2- or 3-lobed by abortion, sparsely white stellate-pubescent. **Fig. 3.**

***Additional specimens examined*: Western Australia.** KIMBERLEY DISTRICT: [localities withheld for conservation reasons] Sep 2011, *Barrett RLB 7460* (PERTH); Sep 2011, *Barrett RLB 7465* (PERTH); Jul 1988, *Blaxell 88/051 & Wrigley* (NSW); Nov 2004, *Byrne 1295* (AD, PERTH); Jan 2005, *Byrne 1295-1* (PERTH); Jul 1978, *Carr 4408 & Beauglehole 48186* (PERTH); May 2010, *Dauncey H 420* (PERTH); Feb 1985, *Foulkes 107* (PERTH); Apr 1985, *Foulkes 139* (PERTH); Jun 1984, *Kenneally 9024* (PERTH); Feb 1992, *Mitchell 2014* (PERTH); Jun 2007, *Reiffer SR 020* (PERTH); Jul 1988, *Sands 5146* (K, PERTH); Apr 1985, *Smith MS 85-18* (PERTH); Jun 2006, *Sweedman 6789* (KPBG, PERTH); Oct 1984, *Willing 141* (PERTH); Jun 1988, *Wilson 12828* (PERTH); Nov 1986, *Wilson 12565* (PERTH); Nov 1986, *Wilson 12570* (PERTH).

***Distribution and habitat*:** *Grewia pindanica* has a scattered occurrence from Broome, Pender Bay and James Price Point to Marion Downs Station and the Oscar Range in the south-west Kimberley region of Western Australia. The plant grows in pindan woodland on sandplains, commonly with *Acacia eriopoda* Maiden & Blakely, *Aristida latifolia* Domin, *Bridelia tomentosa* Blume, *Eriachne pindanica* R.L.Barrett, *Ficus aculeata* A.Cunn. ex. Miq., *Flueggea virosa* subsp. *melanthesoides* (F.Muell.) G.L.Webster,

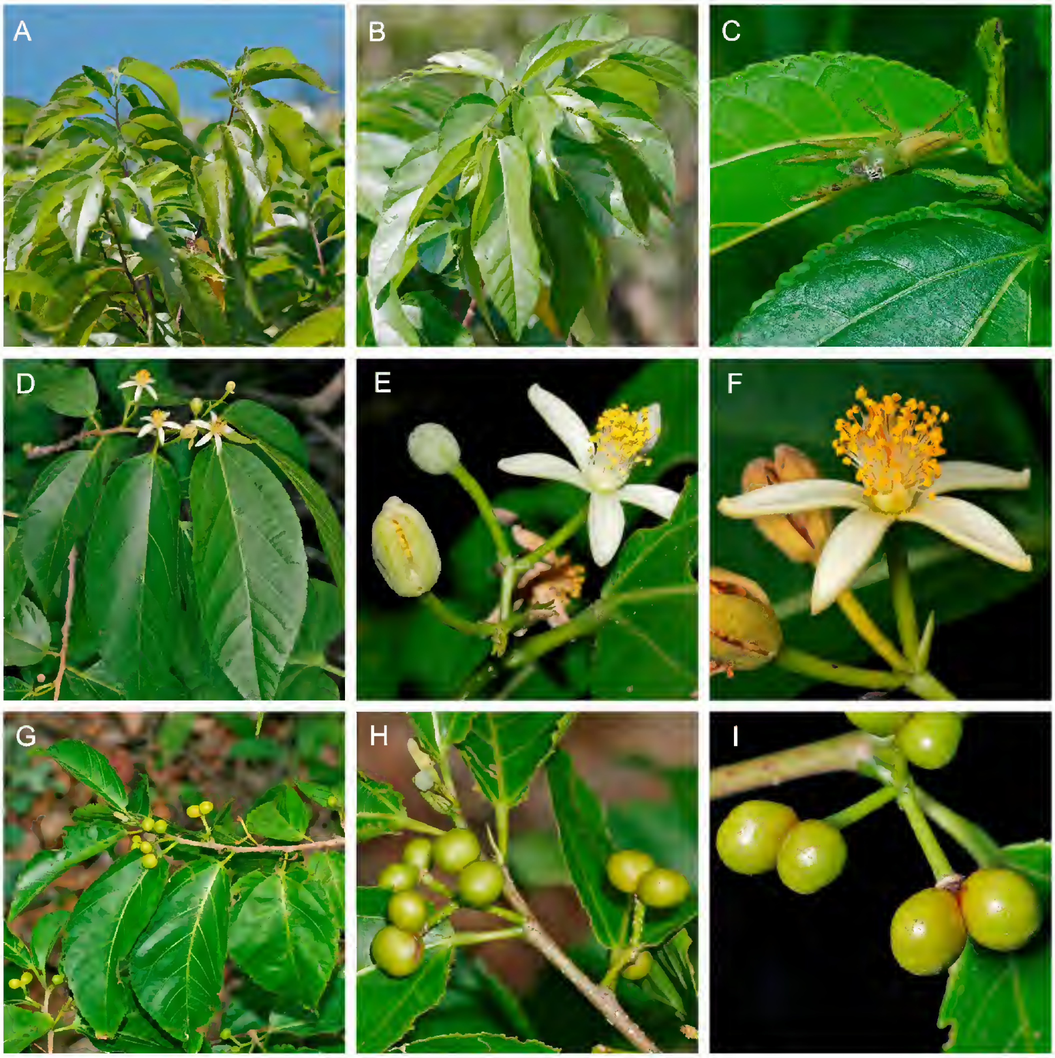

Fig. 2. ***Grewia guazumifolia.*** A, B. leafy branchlet. C. leaf surfaces and margins. D. flowering branchlet. E, F. buds and bisexual flowers. G. Fruiting branchlet. H, I. fruit. A–C. Berthier Island (*RPS - BBG consultants 460*, PERTH). D, F–I. South Maret Island (*RPS - BBG consultants 461*, PERTH). E. North Maret Island (no voucher). Photos: R.L. Barrett.

Gardenia pyriformis subsp. *keartlandii* (Tate) Puttock, *Grewia breviflora* Benth., *Gyrocarpus americanus* subsp. *pachyphyllus* Kubitzki, *Pterocaulon intermedium* (DC.) A.R.Bean and *Spermacoce occidentalis* Harwood.

***Phenology*:** Flowering from January to July. Fruiting from February to September.

***Affinities*:** *Grewia pindanica* is similar in general appearance to *G. savannicola* and probably closely related, differing in the compact few- or multi-stemmed habit (versus many spreading clonal stems); broad juvenile leaves 20–40 mm long, 24–53 mm wide (versus 28–45 mm long and 17–25 mm wide); flowers functionally unisexual male or bisexual (versus flowers functionally unisexual male or functionally unisexual

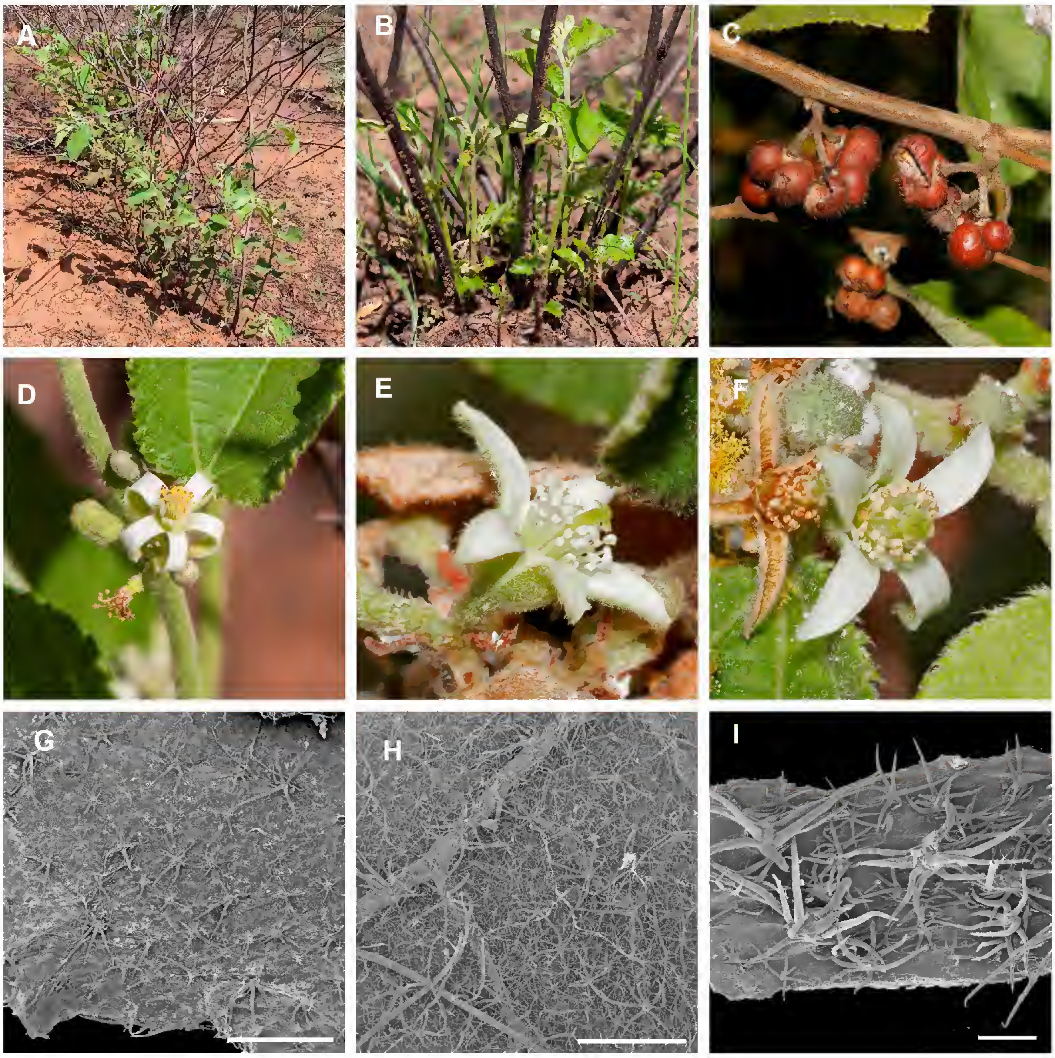

Fig. 3. ***Grewia pindanica.*** A. plants resprouting following fire. B. juvenile leaves post-fire. C. fruit. D. inflorescence with buds, fresh functionally male flower and old flower. E, F. bisexual flower. G. SEM of upper surface of leaf. H. SEM of lower surface of leaf. I. SEM of stem indumentum. Scale bars = 1 mm (G, H); 200 µm (I). All from *Barrett et al. RLB 7065* (PERTH). Photos: R.L. Barrett.

female with few staminodes); stigma lobes with small, blunt apical projections (versus many, and long-filiform). *Grewia pindanica* is possibly also related to *G. eriocarpa* Juss. which differs in being a small tree to 8 m with large stipules 5–10 (versus 2.2–3.2) mm long and papery (versus coriaceous) leaves (see Ya Tang *et al.* 2007).

Notes: *Grewia pindanica* is an important species for indigenous people on the Dampier Peninsula, where it is known as *wombanyilinyli* (Kenneally *et al.* 1996).

This species has been successfully cultivated from seed and grown in the Kings Park Botanic Garden in Perth, Western Australia.

***Conservation status*:** *Grewia pindanica* is to be listed as **Priority Three** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

***Etymology*:** The epithet refers to the pindan habitat in which this species is found. The vernacular name of 'pindan dogs-balls' is suggested.

4. Grewia savannicola R.L.Barrett **sp. nov.** with affinity to *G. pindanica*, but differing by the following combination of characters: small shrub usually < 0.8 m high; stipules 5–6 mm long; bisexual flowers with 10–15 stamens; fertile stigma laciniate, with many fine ± filiform lobes. Differs from *G. retusifolia* in being a small, lignotuberous shrub, usually < 0.8 m high, rather than a large shrub or small tree to 5 m. The fertile stigma of *G. retusifolia* is ± 4-lobed, rather than laciniate. **Typus:** Queensland. South Kennedy District: Black Wattle Creek crossing, 21.6 km N of Belyando Crossing on Gregory Development Road, 22 April 2006, *D.A. Halford Q8999 & G.N. Batianoff* (holo: BRI [AQ0783407], image!; iso: DNA *n.v.*, MEL 2327666, NSW 840845).

Grewia polygama var. *elliptica* Domin, *Biblioth. Bot.* 22(89): 930 (1927). **Type:** Queensland. Cook District: in xerodrymio ad pedem montis Metall Mts. apud opp. Chillagoe, February 1910, *K. Domin 6450* (holo: PR 529054, *n.v.*).

[*Grewia retusifolia auct. non* Kurz: K.A.W. Williams, *Native Pl. Queensland* 1: 139 (1979); J. Brock, *Top End Native Pl.* 210, pl. (1988); T. Low, *Wild Food Pl. Aust.* 117, pl. (1991); B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Region* 168, fig. 45d (1992), *p.p.*; P. Bindon, *Bush Foods* 152, pl. (1996); J. Puruntatameri *et al.*, *Tiwi Pl. & Animals* 56, pl. (2001); W. Cooper & W.T. Cooper, *Fruits Aust. Trop. Rainfor.* 544, (2004); P. Wiynjorrotj *et al.*, *Jawoyn Pl. & Animals* 80, pl. (2005)].

[*Grewia latifolia auct. non* F.Muell. ex Benth.: E. Anderson, *Pl. Centr. Queensl.* 365, pl. (2016), *p.p.* as to BL & TR photos].

[*Grewia polygama auct. non* Roxb.: G. Bentham, *Fl. Austral.* 1: 271 (1863); I.M. Crawford, *Trad. Aboriginal Pl. Res. Kalumburu* 57 (1982); K. Menkhorst & I.D. Cowie, *Survey Wildl. Veg. Purnululu Nat. Pk* 46 (1992)].

Erect to spreading shrub to 0.8 (rarely to 1.5) m high, usually with many stems arising from perennial woody rootstock, main stems to 4 mm diameter. Young branchlets stellate-tomentulose with hairs of three size classes; older branchlets retaining short stellate hairs. Leaves broadly to narrowly elliptic or narrow ovate-elliptic, (4–)5–10.5(–13) cm long, (1.5–)1.8–3.8(–4.5) cm wide, sparsely stellate-puberulous above, densely whitish stellate-tomentulose below, 3-nerved from the base; apex acute or attenuate; base obtuse, sometimes oblique; margin irregularly serrate; petioles 3–8 mm long, densely stellate-tomentulose. Juvenile leaves elliptic to ovate-elliptic, 20–55 mm long, 15–30 mm wide. Stipules linear, 5–6 mm long, stellate-tomentulose. Inflorescences axillary umbellate cymes; peduncles 2.5–9 mm long, 2–4 flowered, 1(–3) cymes per axil; pedicels 2–6(–10) mm long; bracts linear, 2–4 mm long, all parts stellate-tomentulose. Buds obloid, 3–4 mm long. Flowers functionally unisexual male, or functionally unisexual female. Sepals (4)5(6), linear to narrowly elliptic, 5–7.1 mm long, 0.8–2.1 mm wide, white, densely stellate-pubescent outside, glabrous inside; apex acute. Petals (4)5(6), oblong, 1.5–2.3 mm long, 0.7–0.9 mm wide, white; with scattered papillae outside, mostly in the lower half, and an arch of dense villous hairs spreading from the base, across the centre of the inside of each petal around the basal nectariferous gland which is 0.5–0.6 mm diameter, not wider than the base of the lamina; outside face of gland ± smooth. Androgynophore angular, 0.5–0.8 mm long, glabrous in lower half, densely hairy in apical half, elongated above the node. Male flowers: stamens 18–36; filaments white, 2–4.5 mm long; ovary and style rudimentary. Functionally female flowers: stamens 10–28; filaments 1.5–2.1 mm long, white, anthers remaining white to pale brown, small and probably always non-functional; ovary ± globose, 1.1–1.5 mm diameter, densely long-strigose, 2-locular, 4 ovules per loculus; style stout, 2.2–2.6 mm long, glabrous; stigma broadly capitate, laciniate, with many fine ± filiform lobes. Fruit of 2 bilobed parts, 5.7–7.5 mm long, 6.5–13 mm wide, conspicuously 4-lobed or commonly 2- or 3-lobed by abortion, sparsely white stellate-pubescent, sometimes glabrescent reddish-brown, glossy. **Fig. 4.**

***Additional selected specimens examined*:** **Papua New Guinea.** Morobe Province: Sumsum, Mar 1960, *Henty NGF11974* (CANB); Buzi Village, S coast of mainland PNG, *c.* 1 km E of the mouth of the Maikusa River and N of Boigu Island, Jun 1999, *Mitchell 5836 & Gei* (CANB); S coast near Kwikila, Abau Sub-district, Jun 1969, *Paijmans 777* (CANB). **Australia. Western Australia.** Kimberley District: Wulwuldji, near Saming Mining Camp at crossing of Swamp Creek, May 1984, *Forbes 2021* (CANB, DNA, MEL, PERTH); Surveyors vine thicket, Mitchell Plateau, Feb 1979, *Kenneally 7097* (MEL, PERTH); Mornington Wildlife Sanctuary, Clean Skin Pocket, Apr 2005, *Legge MULE 459* (MEL, PERTH). **Northern Territory.** Victoria River District: Gregory NP, Depot Creek, *c.* 27 km ENE Limbunya, Apr 1996, *Cowie 6305 & Jones* (DNA, MEL); Macadam Range, Oct 1855, *Mueller s.n.* (MEL 1599193); near Flapper Hills, *c.* 4 miles [6 km] NW of Leguna Station, Jul 1949, *Perry 2604* (CANB, DNA, MEL). Arnhem District: 'Island of N. Coast', 1818, *Cunningham 186* (CANB, NSW); Gulf of Carpentaria, Maria Island, Jul 1972, *Dunlop 2866* (CANB, DNA, PERTH); *c.* 12 km S of Larrimah on Stuart Highway, May 1985, *Fryxell, Craven & McD. Stewart 4434* (AD, CANB, DNA); Hemple [Hempel] Bay, Groote Eylandt, in the Gulf of Carpentaria, Apr 1948, *Specht 290* (AD, CANB, MEL, NSW, PERTH). **Queensland.** Cook District: New Holland [near Endeavour River], in 1770, *Banks & Solander s.n.* (NSW 133441); Kamerunga, Jun 1892, *Bailey s.n.* (NSW 263445); 5.2 km E of Davies Creek Road from Kennedy Highway, Feb 1992, *Neldner 3668* (BRI, CNS, DNA, NSW); 2 km (by road), SE of Rookwood Homestead, on Burke Developmental Road, *c.* 6 km NW of Mungana, Jun 1983, *Conn & de Campo 1345* (AD, BRI, CANB, MEL, NSW); O'Briens Creek gemfields via Mount Surprise, Jul 1994, *Coveny 16757 et al.* (BRI, CANB, MEL, NSW); 28 miles [46.6 km] N of Conjuboy Station, Feb 1954, *Lazarides 4206* (BRI, CANB, DNA, MEL, NSW). Burke District: Sweers Island, South Wellesley Group, Gulf of Carpentaria, Nov 2002, *Thomas SWI113 & Pedley* (BRI, DNA, NSW); 104 km W of Wollogorang, on road to Doomadgee, Apr 1992, *Halford Q1033* (AD, BRI, DNA, L, NSW). North Kennedy District: Strathdickie North, Feb 1937, *Macpherson 4420* (NSW). Leichhardt District: Comet River, Mar 1844, *Leichhardt 444* (NSW 263448). Port Curtis District: Bay of Inlets, May 1770, *Banks & Solander s.n.* (BRI [AQ0268445], MEL 1599071); 'East coast' [Keppel Bay], Aug 1802, *Brown s.n.* (CANB 278649, NSW 263460); 'North and east coast', [1802], *Brown s.n.* (MEL 1599074); Rockhampton, 1864–66, *Deitrich 2340* (HBG *n.v.*; MEL, NSW).

***Distribution and habitat*:** *Grewia savannicola* occurs in Australia and New Guinea. It is widespread from north of Derby in the West Kimberley, east to Gladstone in Queensland, north to the Torres Strait and southern parts of Papua New Guinea. Plants grow in open woodlands, forests and grasslands, often on basalt soils or black, cracking clays. They commonly grow with *Corymbia* spp., *Eucalyptus* spp., and *Planchonia careya* (F.Muell.) R.Knuth with an understorey dominated by *Chrysopogon* spp., *Cymbopogon* spp., *Heteropogon contortus* (L.) P.Beauv. ex. Roem. & Schult. and *Sarga* spp.

***Phenology*:** Flowering mostly from November to April, but also sporadic in later months. Fruiting from December to July.

***Affinities*:** *Grewia savannicola* is similar in general appearance to *G. pindanica* and *G. retusifolia*, differing from both by its smaller, many-stemmed habit and the shape of the stigma as described above. This species in Australia has continuously been associated with names based on Asian type specimens. With improved access to digital images of type specimens held in European herbaria, it has been possible to reevaluate the circumscription of names previously applied to the Australian taxon. I conclude that none of the names previously applied at specific rank apply, hence the Australian taxon is here described as a distinct species.

There has been considerable confusion of names in the literature, with most regional treatments failing to consider all applicable names, or assuming the taxon present in one country covers a great range of variation in other regions. This has led to suggestions that names such as *G. helicterifolia* Wallich ex G.Don might apply in Australia (Daniel & Chandrabose 1993), but that taxon is more closely allied to *G. hirsuta* Vahl. *Grewia polygama* Roxb. is not covered by Daniel & Chandrabose (1993), despite having been named from 'Bengal'. Ya Tang *et al.* (2007) use the name '*Grewia retusifolia* Pierre', a later homonym of *G. retusifolia* Kurz, which was described from Pegu (Bago) in southern Myanmar (Kurz 1872). It is therefore of

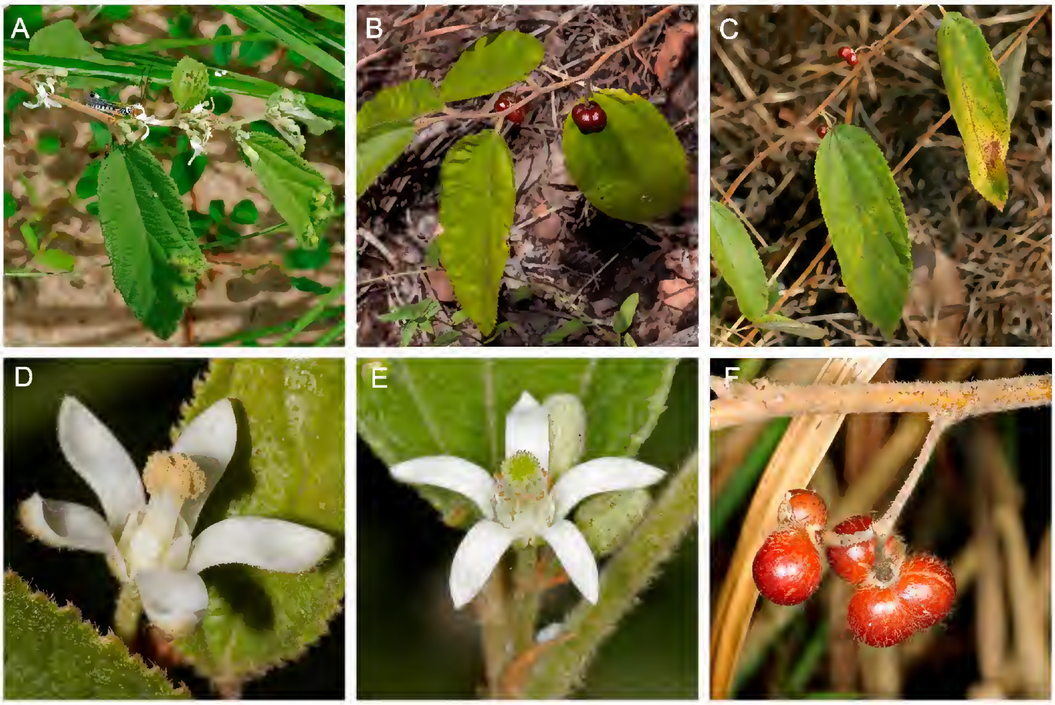

Fig. 4. ***Grewia savannicola.*** A. flowering branch. B, C. fruiting branch. D. fresh functionally male flower. E. bisexual flower. F. fruit. Images from A, E. Bachsten Creek. B, D. Theda Station (*Barrett RLB 8826*, PERTH). C. Middle Osborne Island. F. Doongan Station (*Barrett RLB 7189*, PERTH) (all Western Australia). Photos: R.L. Barrett.

interest that *G. retusifolia* is not considered in the neighboring *Flora of Thailand* (Phengklai 1993).

Grewia retusifolia is consistently described as a large shrub or small tree to 5 m. The leaves are often asymmetric at the base, and the margins very finely serrate. Inflorescences are usually 3-flowered. A fragment at P appears to be original material and is a probable isotype (P 05429303, image!). Specimens matching the type have been examined at NSW: (**Myanmar.** Manhkring, near Myitkyana, Burma, Jul 1958, *McKee 6262*; Plangyn, Sep 1902, *Mokin 94*; Sillotia roadside, Oct 1902, *Mokin 392*; Ruby mines, Burma, Sep 1909, *Rodger D.O. 843*).

***Notes*:** *Grewia savannicola* is an important food and medicinal plant for indigenous groups across northern Australia, with sweet, edible fruit; leaves are used as a tobacco substitute; or leaves and roots are crushed and boiled as an effective treatment for diarrhoea, and to create a poultice for boils and skin irritations, a use still in practice (Low 1990; Aboriginal Communities of the Northern Territory *et al.* 1993; Blake *et al.* 1998; Clark 2007; Cowie *et al.* 2011; Karadada *et al.* 2011; Leach *et al.* 2017).

It is noteworthy that this species was collected by Banks & Solander, Brown, and Mueller, but not recognised as distinct by any of these botanists. This reflects the challenges involved in reconciling the taxonomy of species or genera shared between Asia and northern Australia.

While the host of *Uredopeltis chevalieri* J.Walker & Shivas is listed as *G. breviflora* Benth. (Walker & Shivas 2004), it was actually *G. savannicola*, the original collection having been observed by the author.

***Conservation status*:** *Grewia savannicola* is widespread and not threatened.

***Etymology*:** The epithet refers to the distribution of this species coinciding with that of the savanna of northern Australia and southern Papua New Guinea. Known as 'dog's balls', 'emu berry', 'dogs nuts', 'dysentery bush', 'dysentery plant' or 'turkey bush'.

5. Triumfetta kenneallyi Halford, *Austrobaileya* 4: 531, fig. 5d (1997). **Type:** Western Australia. KIMBERLEY DISTRICT: Mitchell Plateau [precise locality withheld for conservation reasons], 30 April 1982, *K.F. Kenneally 8186* (holo: PERTH 01547445; iso: BRI [AQ0717038], CANB 0498833, DNA [D0148649]).

[*Triumfetta rhomboidea auct. non* Jacq.: B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Reg.* 174, fig. 46f (1992)].

Perennial shrub, 0.2–1(–3) m high, to 0.7(–1.5) m across, much branched from the base; main stem usually procumbent, occasionally erect, branches erect to spreading. Indumentum on branchlets, petioles, peduncles and pedicels moderately dense to dense; hairs stellate, 0.2–1 mm diameter, with stiff rarely pliable, spreading to appressed rays. Leaves lanceolate to ovate, 10–95 mm long, 4.5–55 mm wide; discolorous; apex acute to slightly acuminate; base rounded or obtuse to slightly cordate; margin crenulate-serrulate; indumentum adaxially sparse to moderately dense, abaxially sparse to dense; hairs stellate, 0.4–1 mm diameter, with stiff, spreading rays. Petioles 2–20 mm long. Stipules filiform, 0.8–3 mm long, hirsutellous. Flowers 2–9, in axillary cymules; cymules 1–4 per node, occasionally arising well above node, often forming axillary paniculate inflorescences by reduction of subtending leaves; peduncles 2.2–7 mm long; pedicels 0.7–14 mm long; bracts ± linear to narrowly triangular, 0.6–2 mm long, hirsutellous. Sepals linear to narrowly ovate, 1.3–5 mm long, 0.3–1 mm wide; indumentum on abaxial surface dense, with stellate hairs 0.2–0.5 mm diameter, the adaxial surface glabrous to densely stellate villous near base; appendages subapical, erect, subulate, ovate or depressed obovate, 0.3–0.5 mm long, entire, glabrous or stellate hairy, hairs *c.* 0.2 mm diameter. Petals linear-oblong, narrowly obovate to almost spathulate, 1.4–3 mm long, 0.3–0.7 mm wide; claw 0.6–1 mm long, ciliolate to pubescent. Androgynophore 0.2–0.3 mm long; glands ovate; annulus 0.2–0.5 mm long, a few cilia on margin. Stamens 4–6 (usually 5); filaments 1–3 mm long, glabrous; anthers subglobular to oblong, 0.05–0.5 mm long. Ovary subglobose, 0.6–1 mm diameter, 2- or 3-locular, with thick, recurved setae; style 0.7–2.5 mm long, glabrous; stigma 2 or 3-lobed. Fruit ellipsoid to subglobose or globose, round in cross section, 2–9 mm long, 1.6–7.2 mm wide, sparsely to densely covered with slender stellate hairs 0.2–0.5 mm diameter, sparsely to densely setose; prickles subterete to terete, tapering towards the apex, 0.8–3 mm long, erect, pliable, arranged randomly, *c.* evenly spread, almost glabrous with just a few simple hairs to 0.05 mm long, or with a sparse covering of stellate hairs *c.* 0.5 mm diameter near the base, terminated by a single hooked seta 0.3–0.5 mm long. **Fig. 5.**

***Additional specimens examined*: Western Australia.** KIMBERLEY REGION: [localities withheld for conservation reasons]: Feb 2006, *Barrett & Barrett RLB 3265A* (BRI, DNA, PERTH); Jun 2012, *Barrett RLB 7690* (PERTH); Jun 2012, *Barrett RLB 7716* (CANB, PERTH); Mar 1989, *Keighery 10693* (PERTH); Jun 1987, *Kenneally & Hyland KFK 10494* (CANB, PERTH); Jun 1987, *Kenneally & Hyland KFK 10269* (CANB, PERTH); May 1996, *Mitchell 4375* (BRI, *n.v.*, PERTH); Jul 1949, *Perry 2650* (CANB, PERTH).

***Distribution and habitat*:** *Triumfetta kenneallyi* is known from just nine locations in the vicinity of Mitchell Plateau, Doongan Station, Kalumburu and Carlton Hill Station. Found on broken sandstone ridges where it often grows under rock overhangs in small rock fissures with *Ficus brachypoda* (Miq.) Miq., *Panicum minutum* R.Br., *Plectranthus scutellarioides* (L.) R.Br. and *Stylidium notabile* A.R.Bean.

***Phenology*:** Flowering and fruiting recorded for May to July.

***Affinities*:** *Triumfetta kenneallyi* is distinguished from all other Australian species by the following combination of characters: Leaves discolorous, base obtuse

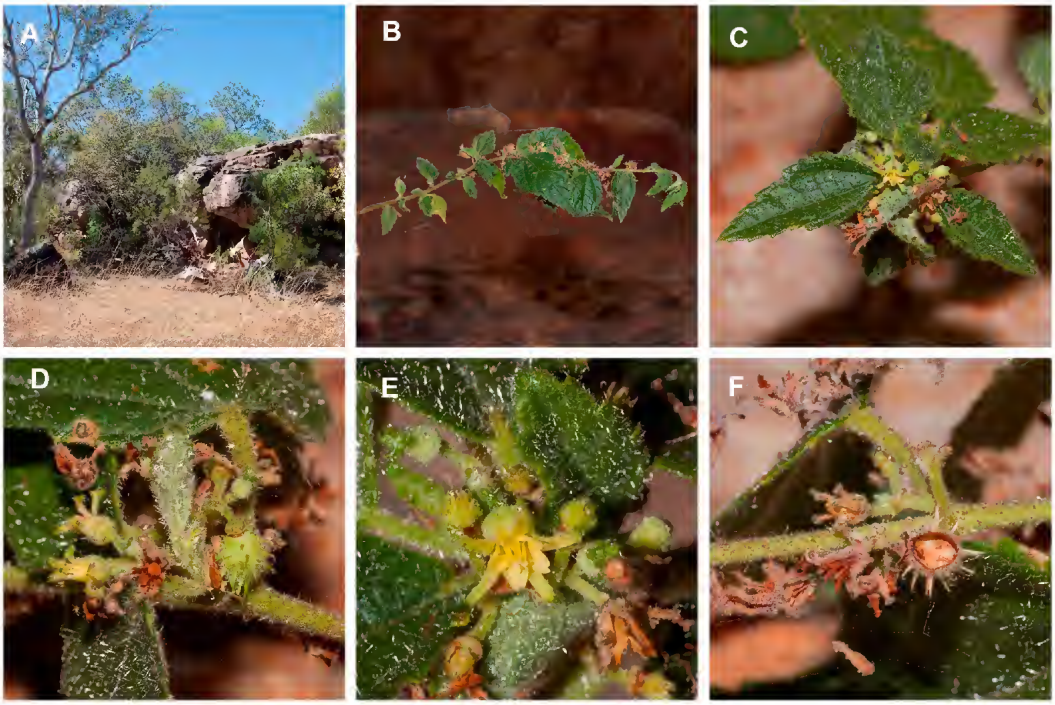

Fig. 5. ***Triumfetta kenneallyi.*** A. habitat. B. habit under rock overhang. C. leaves on flowering branchlet. D. fruiting and flowering branchlet. E. flower. F. fruit (partly eaten). A from *Barrett RLB 7716* (PERTH); B–F from *Barrett RLB 7690* (PERTH). Photos: R.L. Barrett.

to slightly cordate, 10–95 mm long, 4.5–55 mm wide. Petioles 2–20 mm long. Stipules filiform, 0.8–3 mm long. Flowers to 9, in axillary cymules; pedicels 0.7–14 mm long. Sepals 1.3–5 mm long, 0.3–1 mm wide. Petals linear-oblong, narrowly obovate to almost spathulate, 1.4–3 mm long, 0.3–0.7 mm wide. Anthers subglobular to oblong, 0.05–0.5 mm long. Fruit 1.6–7.2 mm wide, bristles 0.8–3 mm long, *c.* evenly spread, almost glabrous with just a few simple hairs, or with a sparse covering of stellate hairs, terminated by a single hooked seta.

Small plants are superficially similar in appearance to *Triumfetta coronata* Halford and *T. triandra* F.Muell., differing in the much smaller floral parts, discolorous leaves to 26 mm wide and fruit with setae evenly spread, not oriented in lines (as in *T. triandra*) nor clustered at the apex (as in *T. coronata*).

Notes**:** Most of the available collections have very few if any flowers and half have few or no fruit, so the collection of additional fertile collections is highly desirable. There is variability in the size of many organs between plants from open areas and those growing under rock overhangs and it is possible that further collections will warrant a re-examination of variation in this species.

Conservation status**:** *Triumfetta kenneallyi* is to be listed as **Priority Three** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.). It is only known from nine populations over a range of about 320 km.

Etymology**:** The epithet recognises the work of Kevin F. Kenneally in documenting the flora of the Kimberley region. The vernacular name of 'Kenneally's Triumfetta' is suggested here.

Acknowledgements

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Reinstatement of *Ptilotus parviflorus* (Lindl.) F.Muell. (Amaranthaceae)

A.R. Bean

Summary

Bean, A.R. (2019). Reinstatement of *Ptilotus parviflorus* (Lindl.) F.Muell. (Amaranthaceae). ***Austrobaileya* 10(3): 473–479.** *Ptilotus parviflorus* (Lindl.) F.Muell., a species allied to *P. obovatus* (Gaudich.) F.Muell., is lectotypified and reinstated. The distinguishing morphological features of the two species are listed. Distribution maps and illustrations are provided for both species.

Key Words: Amaranthaceae, *Ptilotus obovatus*, *Ptilotus parviflorus*, taxonomy, Australia flora, distribution map

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Introduction

Ptilotus obovatus (Gaudich.) F.Muell. was described from the west coast of Western Australia, but is known from all mainland states of Australia (AVH 2019), and is quite variable, with a number of recognised morphotypes. Some of these morphotypes may be associated with polyploidy, which has been demonstrated for *P. obovatus* (Stewart & Barlow 1976). These authors also noted gynodioecy (male sterility in some populations) for *P. obovatus*.

Taxonomic treatments of recent decades have relegated *Ptilotus parviflorus* (Lindl.) F.Muell. to varietal rank under *P. obovatus* (Benl 1959) or to synonymy with it (Bean 2008).

During a recent reappraisal of specimens at the Queensland Herbarium identified as *Ptilotus obovatus* (Gaudich.) F.Muell., it was realised that numerous specimens from the eastern edge of the range of *P. obovatus* were distinctly different in morphology. These taxa were initially separated by the features of the hairs on the outer surface of the tepals, and because this correlated well with other characters, it was decided that the two taxa should be recognised at species rank. The more widespread taxon is *Ptilotus obovatus s. lat.*, while the other includes the type of *P. parviflorus* (Lindl.) F.Muell. and is reinstated here.

Materials and methods

This study is based on a morphological examination of herbarium specimens at BRI (205 of *Ptilotus obovatus s. lat.*, 80 of *P. parviflorus*), originating from Western Australia, Northern Territory, South Australia, Queensland and New South Wales. Specimen images from CANB, CGE, K, MEL and NSW have also been examined. All measurements are based on dried herbarium specimens.

Taxonomy

Ptilotus parviflorus (Lindl.) F.Muell., *Syst. Census Austral. Pl.* 1: 28 (1883); *Trichinium parviflorum* Lindl., *Three Exped. Australia [Mitchell]* 2: 12 (1838); *Ptilotus obovatus* var. *parviflorus* (Lindl.) Benl, *Mitt. Bot. Staatssamml. München* 3: 512 (1959). **Type:** New South Wales. Interior of New Holland [Byrne's Creek, E of Forbes, 33° 27'S 148° 19'E], 24 March 1836, *T.L. Mitchell* (lecto: CGE [here chosen, digital image at BRI!]; isolecto: K 000356788; K 000356789).

Trichinium virgatum A.Cunn. ex Miq., *Prodr. [A. P. de Candolle]* 13(2): 286 (1849). **Type:** New South Wales. Swampy plains near

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Lachlan River, July 1817, *A. Cunningham 17/1817* (syn: K 000196975).

Trichinium subviride Domin, *Biblioth. Bot.* 89: 81 (1921). **Type:** Queensland. Burke District: Near Cloncurry, January 1910, *K. Domin s.n.* (holo: ?PR, *n.v.*).

Ptilotus obovatus var. *lancifolius* Benl, *Mitt. Bot. Staatssamml. München* 4: 279 (1961). **Type:** Queensland. Burke District: 13 miles [21 km] SSE of Kajabbi township, 29 August 1953, *M. Lazarides 4006* (holo: CANB; iso: BRI, MEL).

Sparsely branched woody shrub 30–50 cm high. Branchlets with dense to very dense verticillate hairs 0.1–0.2(–0.4) mm long; older stems sparsely to densely hairy, terete. Leaves alternate, sessile or sub-sessile; lamina narrowly elliptic to spathulate, 23–57 mm long, 5.3–15 mm wide, 3.4–5 times longer than broad, pale green, surface smooth, apex acute; upper surface with hairs sparse to moderately dense, persistent, stellate to rarely verticillate; midrib visible, but no other venation apparent; lower surface with hairs sparse to dense, persistent, verticillate or sometimes stellate; midrib visible, and a few lateral veins often visible. Inflorescence terminal, spicate, spikes ovoid to cylindrical, 1.2–3.7 cm long, many-flowered. Rachis 10–35 mm long with very dense spreading verticillate hairs to 0.4 mm long. Bract broadly ovate, cymbiform, translucent, brittle, 2.6–3.5 mm long, apex mucronate, inner surface glabrous, outer surface densely covered with verticillate hairs. Bracteoles broadly ovate, cymbiform, translucent, brittle, 2.5–3.7 mm long, apex mucronate, inner surface glabrous, outer surface with dense verticillate hairs along midrib, otherwise ± glabrous. Perianth 5.6–7 mm long, grey with pink tip. Tepals linear, hairs spreading verticillate to nodose, 1–1.5 mm long in distal half, 0.3–0.6 mm long at base, apex glabrous. Outer tepals 2, 4.9–6.8 mm long, glabrous on inner surface; inner tepals 3, 4–6.3 mm long, glabrous on inner surface, except for sparse hairs at base of innermost tepal. Fertile stamens 3, filaments of varying length, 1.5–3 mm long, anthers 0.4–0.65 mm long, dorsifixed, versatile; staminodes 2, comprising flattened filaments 2–3 mm long. Ovary glabrous; style conspicuously eccentric, straight, 2.5–2.8 mm long, glabrous; stigma slightly broader than style. **Figs. 1–3.**

***Additional selected specimens examined*: Northern Territory.** Near Rockhampton Downs, May 1947, *Blake 17847* (BRI, DNA). **Queensland.** Burke District: Cloncurry, Nov 1935, *Blake 10118* (BRI, DNA); NW of Hughenden, Nov 1935, *Blake 10078* (BRI, DNA, PERTH); S of Julia Creek – Burketown Road on the access road to Alcala station, Mar 2005, *Fox IDF3613 & Wilson* (BRI, PE). North Kennedy District: Muntalunga Range, SE of Townsville, Apr 1996, *Cumming 14515* (BRI); Tomato Pocket, Great Basalt Wall, Jun 1992, *Fensham 4* (BRI). South Kennedy District: 9.5 km W of St Anns Homestead, Jun 1992, *Thompson BUC469 & Sharpe* (AD, BRI, K, PR, US); 'Weetalabah', Jan 1993, *Fensham 511* (BRI). Mitchell District: Manningham Station, 2 km E of homestead, 45 km W Longreach, Oct 1989, *White NE51636A* (AD, BRI, NE); Merrick paddock, 'Vergemont', W of Longreach, May 2004, *Bean 22324* (BRI, NSW); Capricorn Highway, 19.8 km W of Barcaldine, May 2010, *Bean 29718* (BRI, NT); 'Spring Plains', 100 km WSW of Longreach, Apr 1989, *Emmott 276* (BRI). 44.9 km from Blackall towards Adavale, Oct 1983, *Canning 6190 & Rimes* (BRI, CANB, M, NSW); Enniskillen, Dec 1941, *White 11661* (BRI); Gregory North District: Elderslie, W of Winton, on upper parts of Mt Booka Booka, Oct 1935, *Blake 10054* (BRI, DNA); Bladensburg NP, S of Winton, Middle Creek, Mar 1998, *Forster PIF22292 & Booth* (AD, BRI, MEL); Winton – Jundah road, 19.4 km N of 'Elvo' Homestead, May 2004, *Bean 22557* (BRI, NSW); 143 km by road SE of Boulia, 15 km past 'Springvale' Homestead on road to Diamantina Lakes, Mar 2001, *Thomas 2191 & Fechner* (BRI). Warrego District: Morven, Dec 1890, *Bailey s.n.* (BRI [AQ178727]). **New South Wales.** 4.6 km E of Peisley junction, *c.* 50 km SSW of Nyngan, Mar 2008, *Bean 27684* (BRI).

***Distribution and habitat*:** *Ptilotus parviflorus* is widespread in central-western Queensland, and extends to the coast near Townsville; also in New South Wales, as far south as Forbes, and in central Northern Territory (**Map 1**). It grows in a variety of habitats, including clay plains with *Acacia cambagei* R.T.Baker, stony hills with red soil dominated by *Acacia aneura* F.Muell. ex Benth., and on mesa slopes with *Eucalyptus leucophloia* Brooker and *Triodia* sp. In New South Wales, it can occur with *E. populnea* F.Muell. and *E. woollsiana* R.T.Baker.

***Phenology*:** Flowers are recorded for every month of the year.

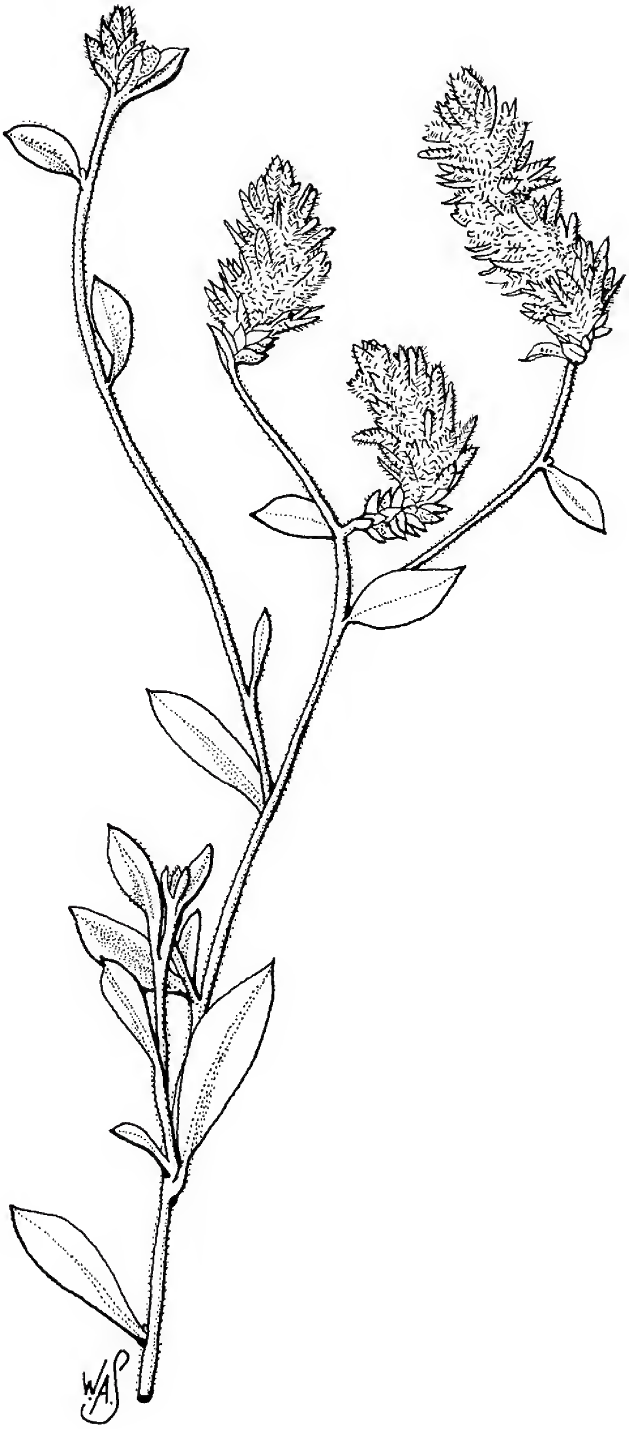

Fig. 1. Flowering branchlet of ***Ptilotus parviflorus*** (*Bean 22557*, BRI).

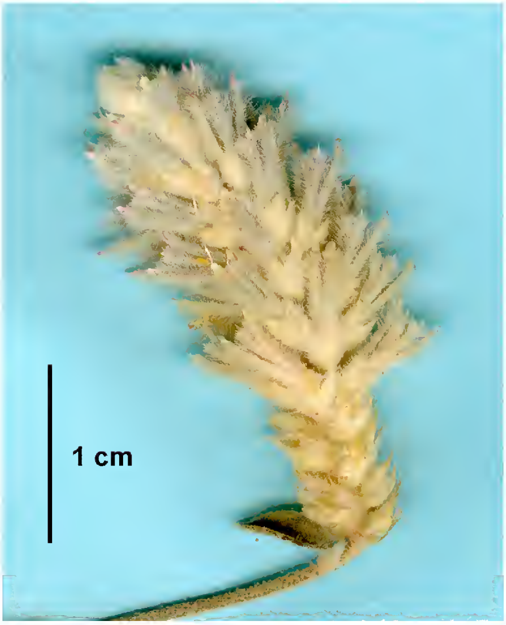

Fig. 2. Inflorescence of ***Ptilotus parviflorus*** (*Bean 22557*, BRI).

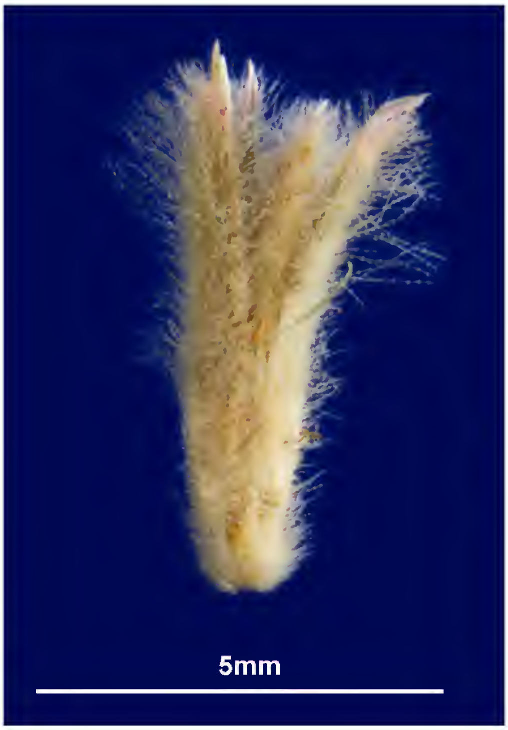

Fig. 3. Lateral view of ***Ptilotus parviflorus*** flower (bract and bracteoles removed) (*Bean 22557*, BRI).

***Typification*:** A specimen at K (K 000356788), collected from Lachlan River by T.L. Mitchell is so similar to the lectotype of *Ptilotus parviflorus* that it is here considered an isolectotype, despite the field label saying "Mitchell 23"; the label of the lectotype includes a number "24", but this is not in Mitchell's hand. K 000356789 is also very similar to the lectotype, and is likewise considered to be an isolectotype. Someone has written the year of collection as "1838", but this must be a mistake as Mitchell was not involved with any exploration in that year.

The type of *Trichinium subviride* has not been seen, and its placement as a synonym of *P. parviflorus* is based on the description given in the protologue.

***Affinities*:** In *Ptilotus parviflorus*, the hairs on the outer surface of the tepals are 1–1.5 mm long (midway along or towards apex of tepal), and 0.3–0.6 mm long at the base of the tepal; the inflorescences are up to 3.7 cm long; the bracteoles are very densely hairy almost throughout and creamy-yellow in colour; and the ovary is glabrous. In *Ptilotus obovatus*, the tepal hairs are 2–3.8 mm long for most of the tepal length, and 1.2–2.5 mm long at the tepal base (**Fig. 4**); the inflorescences are up to 2.4 cm long; the bracteoles are sparsely hairy throughout in most variants, or at times glabrous, and often dark brown in colour (one variant can have densely hairy bracteoles); and the ovary always has a cluster of erect hairs (0.25–0.5 mm long) adjacent to the style.

***Notes*:** The geographical ranges of *Ptilotus obovatus* and *P. parviflorus* overlap considerably (**Map 2**), but the author has been unable to detect any evidence of hybridisation or intergradation, and it is postulated that they are reproductively isolated. No evidence of gynodioecy has been observed in herbarium specimens of *P. parviflorus*, providing another potential difference from *P. obovatus* (Stewart & Barlow 1976).

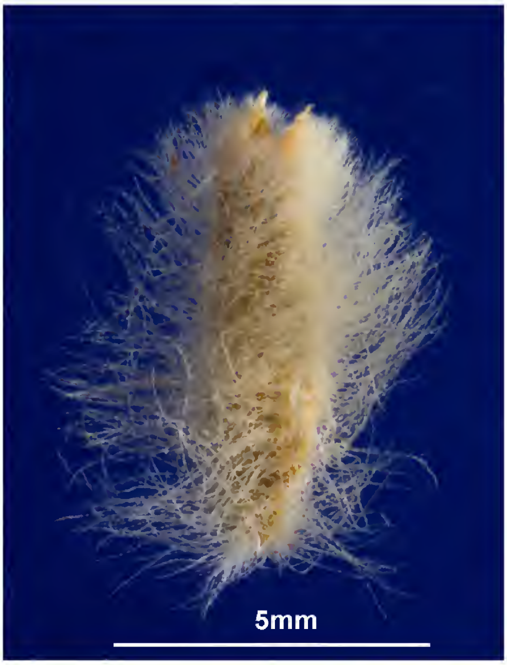

Fig. 4. Lateral view of ***Ptilotus obovatus*** flower (bract and bracteoles removed) (*Cowan 21 & Bushell*, BRI).

***Conservation status*: Least concern** (IUCN 2012).

Acknowledgements

I thank Chris Appelman (BRI) for providing the unusual *Ptilotus* specimen (*P. parviflorus*) that led to this paper. Will Smith (BRI) provided the illustrations and distribution maps.

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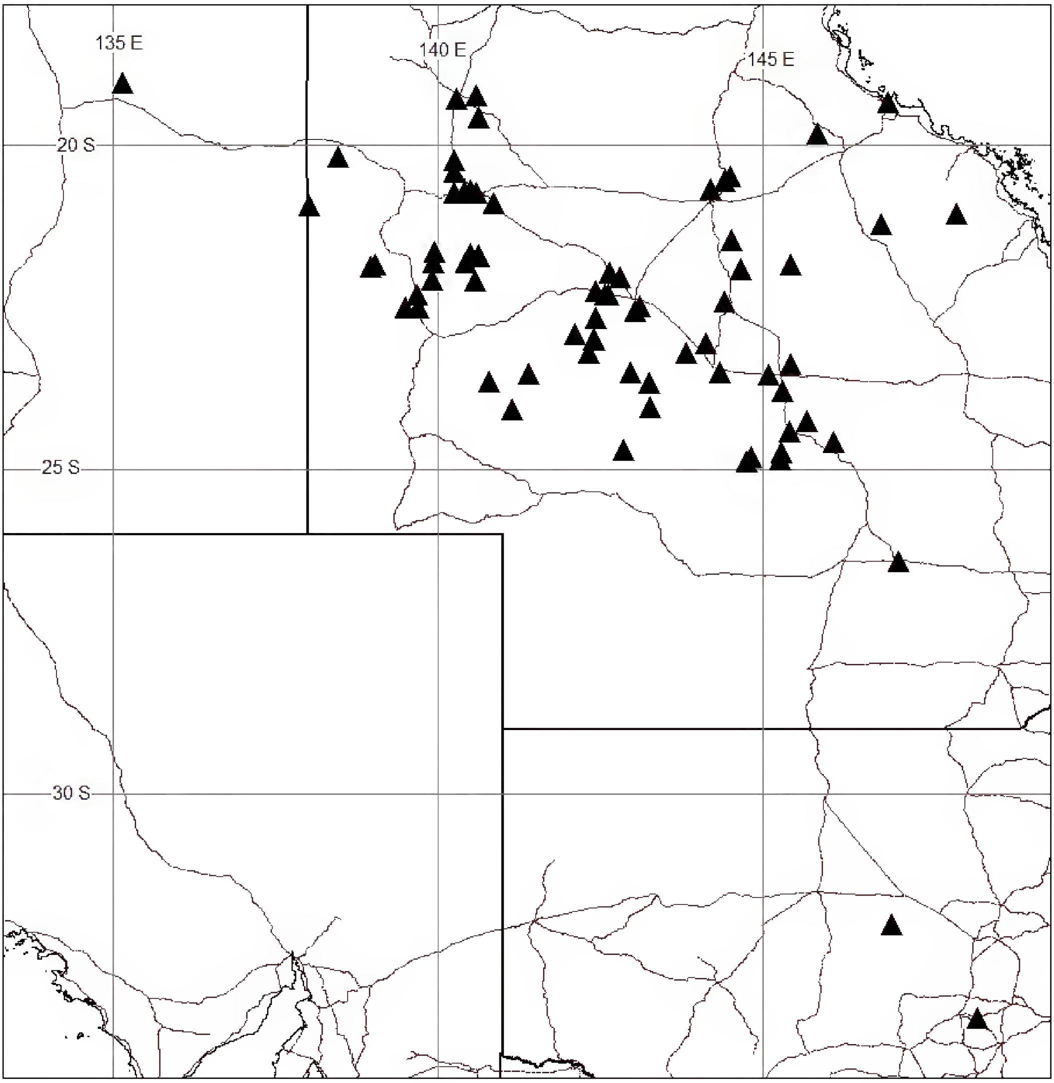
135 E
140 E
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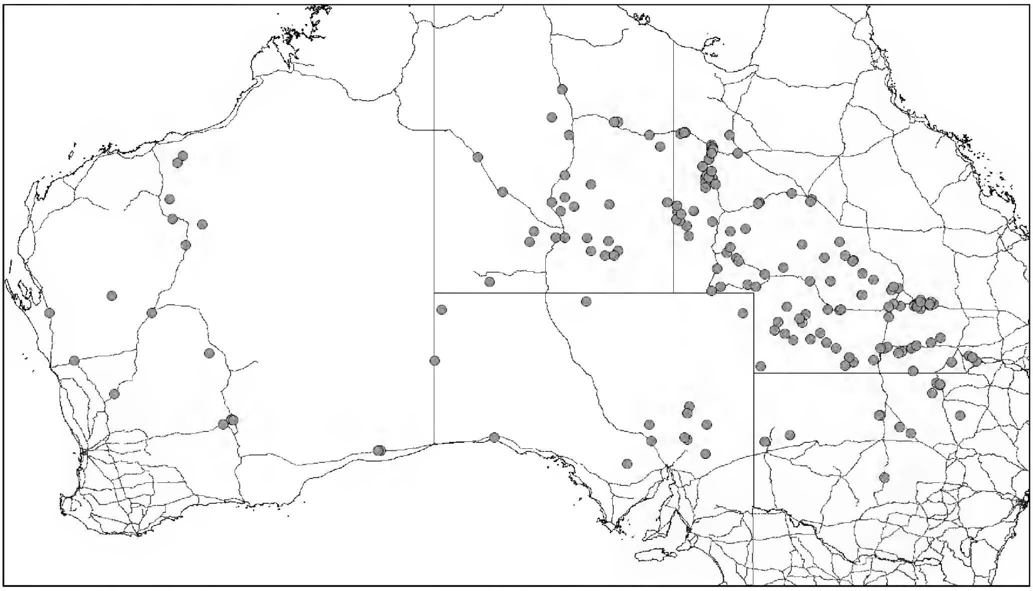
20 S
25 S
30 S

Map 1. Distribution of ***Ptilotus parviflorus*** based on BRI records.



Map 2. Distribution of ***Ptilotus obovatus*** *s. lat.* based on BRI records.

A re-evaluation of the taxonomic status of the Australian species of *Arthraxon* Beauv. and *Thelepogon* Roth (Poaceae: *Panicoideae*: *Andropogoneae*)

E.J. Thompson

Summary

Thompson, E.J (2019). A re-evaluation of the taxonomic status of the Australian species of *Arthraxon* Beauv. and *Thelepogon* Roth (Poaceae: *Panicoideae*: *Andropogoneae*). ***Austrobaileya*** **10(3): 480–505.** The new combination *Arthraxon australiensis* (B.K.Simon) E.J.Thomps. is made based on *Thelepogon australiensis* B.K.Simon following detailed comparison of *A. castratus* (Griff.) Narayanaswami ex Bor and *T. elegans* Roth ex Roem. & Schult. using gross morphology, micromorphology and anatomy.

Key Words: Poaceae; *Panicoideae*; *Andropogoneae*; *Arthraxoninae*; *Arthraxon*; *Arthraxon australiensis*; *Arthraxon castratus*; *Thelepogon australiensis*, *Thelepogon elegans*; Australia flora; Queensland flora; anatomy; micromorphology; new combination

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Introduction

Arthraxon Beauv. and *Thelepogon* Roth comprise mostly tropical to subtropical grasses belonging to the tribe *Andropogoneae* Dumort. in the subfamily *Panicoideae* Link. The tribe is distinguished by paired spikelets, sessile and pedicellate (the latter sometimes reduced or absent), with the sessile ones bearing the upper lemma (fertile) typically with a geniculate awn comprising a spiralled column with a bristle (Bentham 1881; Clayton 1973; Clayton & Renvoize 1986; Watson & Dallwitz 1992; Kellogg 2015). However, the placement of *Arthraxon* and *Thelepogon* at subtribal level has vacillated. Bentham (1881) distinguished four subtribes and placed *Arthraxon* in *Arthraxeae* Benth. and *Thelepogon* in *Andropogoneae* Benth. (as *Euandropogoneae* Benth.). He defined *Arthraxeae* by the pedicellate spikelet absent and sometimes the pedicel lacking and *Andropogoneae* by the heterogamous spikelet-pair. Bentham (1881) remarked that the spikelets of *Thelepogon*, although having similarities to *Ischaemum* L. (*Andropogoneae*), are “remarkable for the rigid tuberculate …. glumes”. Clayton (1972) used numerical analysis of morphological data to define seven subtribes and placed *Arthraxon* in subtribe *Arthraxoninae* Benth. and *Thelepogon* in subtribe *Ischaeminae* J.Presl. Clayton & Renvoize (1986) used a “pragmatic” morphological approach to distinguish eleven subtribes of which seven comprise the awned genera that mostly overlap with the classification by Clayton (1972) although *Arthraxon* was placed in subtribe *Andropogoninae* but *Thelepogon* remained in *Ischaeminae*. *Andropogoneae* and *Ischaeminae* were considered by Clayton & Renvoize (1986) to be closely related and often difficult to separate, primarily differing by the latter having a 2-keeled lower glume. Watson & Dallwitz (1992) recognised three subtribes and placed both genera in *Andropogoninae*. From molecular phylogenetic studies, Soreng *et al.* (2015) and Soreng *et al.* (2017) classified nine subtribes with *Arthraxon* in its own subtribe *Arthraxoninae* and *Thelepogon* in *incertae sedis*.

The various types of trichomes present on the leaves of species of *Andropogoneae* have been considered to be of taxonomic value in studies such as Khan *et al.* (2017), Nazir *et al.*

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(2013) and Ullah *et al.* (2011). The distinctive combination of ciliate margin and heart-shaped leaf base shared by *Arthraxon* and *Thelepogon* (**Figs. 1 & 2**), is very uncommon in *Andropogoneae* (Prain 1917; Hutchinson & Dalziel 1936; van Welzen 1981; Watson & Dallwitz 1992; Simon 1993; Davidse 1994). However, some species in other genera have one or the other of these characters, for example *Clausospicula* Lazarides has just ciliate margins (Lazarides *et al.* 1991). On the other hand, several genera in tribe *Paniceae* R.Br. have stem-clasping leaves but few, such as *Panicum* L., have this combination with ciliate margins (Watson & Dallwitz 1992). Simon (1993) considered that the difference in type of trichomes on the leaf margins to be one of the distinguishing characters between *Thelepogon elegans* Roth ex Roem. & Schult. and *T. australiensis* B.K.Simon.

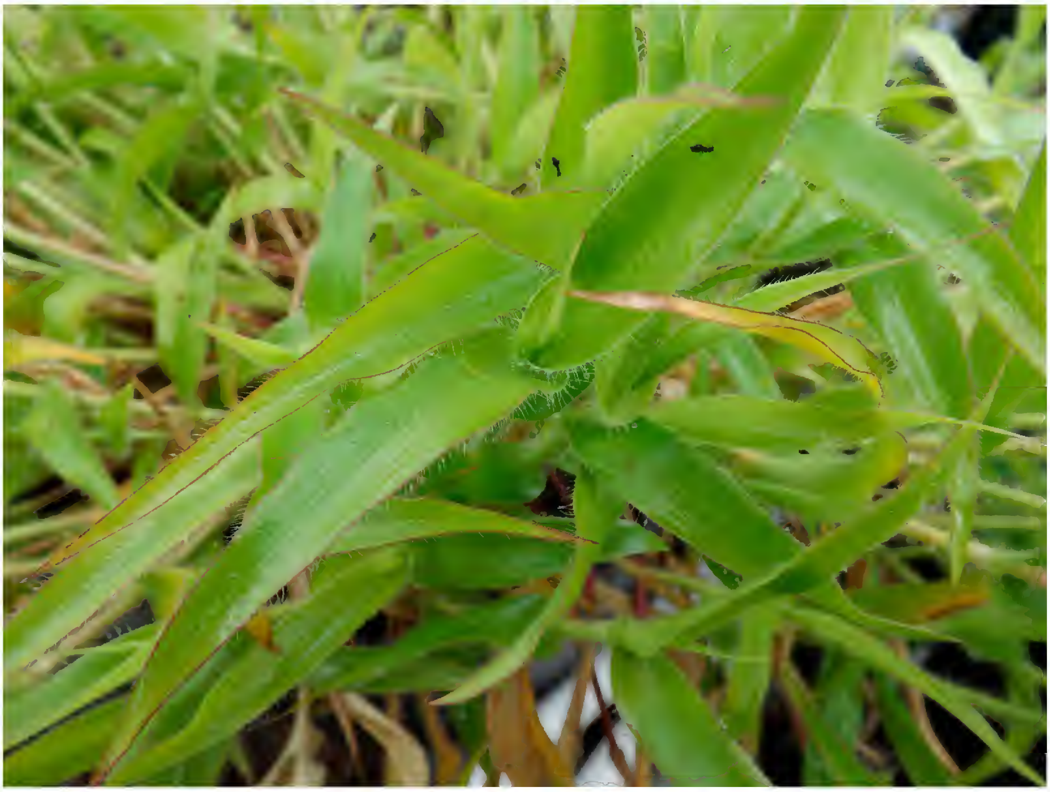


Fig. 1. Cultivated plant of ***Arthraxon australiensis*** showing amplexicaule leaves with cilia on margins (*Thompson MOR803*, BRI). Image: E.J. Thompson.

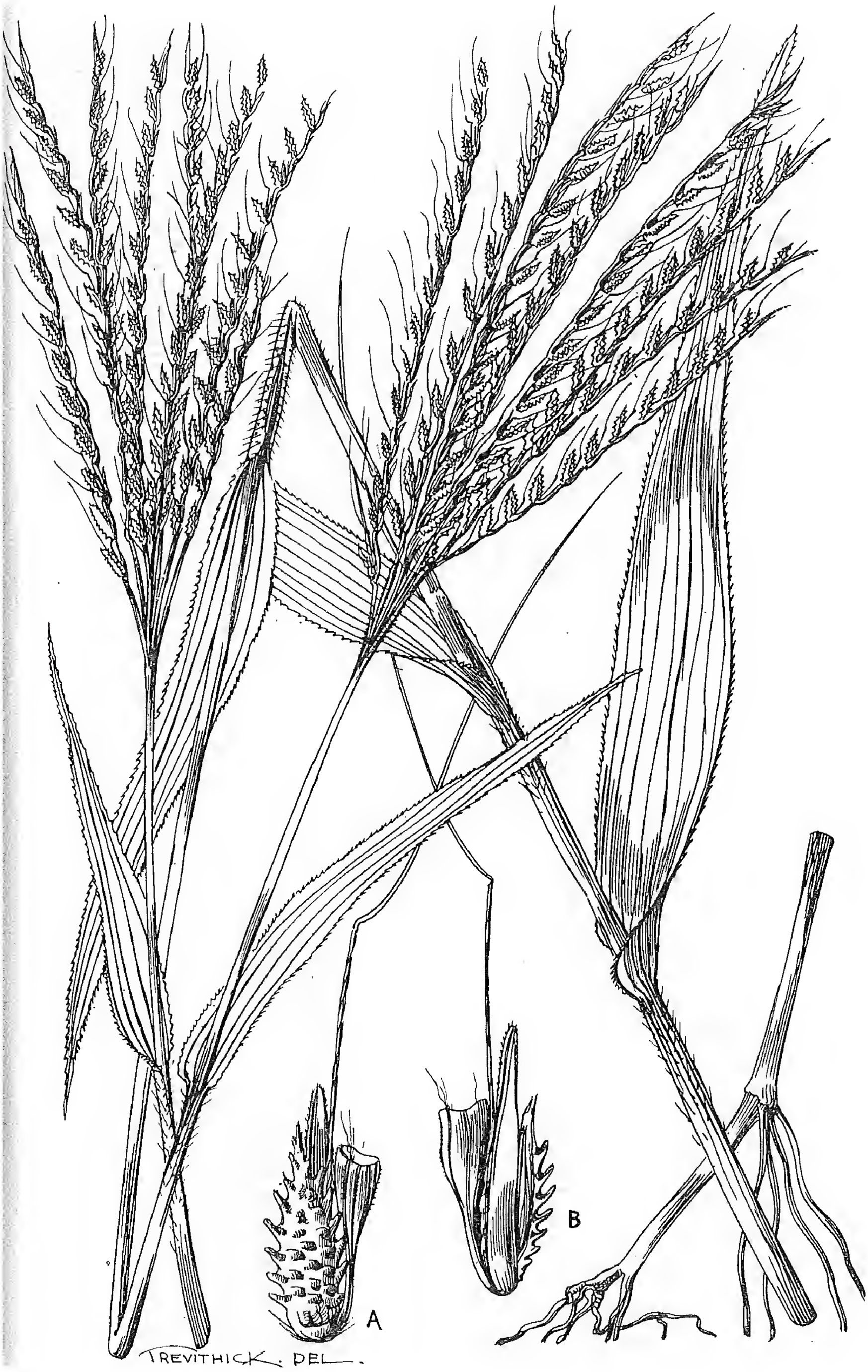


Fig. 2. ***Thelepogon elegans*** from Hutchison & Dalziel (1936). Drawings show subdigitate inflorescences, caudate leaves and prop roots.

Prior to this paper, *Arthraxon* consisted of seven species and *Thelepogon*, two species. *Arthraxon* species are distributed across Africa, Asia, America and Australia (van Welzen 1981). Two species of *Arthraxon* have been recorded as indigenous for Australia, *viz. A. castratus* (Griff.) Narayanaswami ex Bor and *A. hispidus* (Thub.) Makino var. *hispidus* (Bostock & Holland 2017). The three records of *A. castratus* are from northern Queensland, although this species is otherwise known from India, Java, Sri Lanka and southern Vietnam. *A. hispidus* var. *hispidus* has been recorded for the temperate, mid eastern coast of Australia but it has the widest worldwide distribution in terms of both latitude and longitude of all the species of *Arthraxon* (van Welzen 1981). *Thelepogon australiensis* was known from only the type (**Fig. 3**) collected from northern Australia (**Map 1**). *Thelepogon elegans* has been recorded across Africa and Asia (Watson & Dallwitz 1992).

Recent curation of specimens of the Australian species of *Arthraxon* and *Thelepogon* held at the Queensland Herbarium (BRI) revealed some taxonomic anomalies. It was found that the three specimens (one sterile), of what has been previously identified as *A. castratus* and the holotype specimen of *T. australiensis* match each other. The three fertile specimens key to *Arthraxon* using the key to genera of grasses by Clayton & Renvoize (1986) and they key to *A. castratus* using the key to the species of *Arthraxon* by van Welzen (1981). However, the spikelets differ from the drawings provided by van Welzen and the type specimen of *A. castratus* (**Fig. 4**). Following a comprehensive study of gross morphological, micromorphological and anatomical characters (**Table 1**), it was concluded that *Thelepogon australiensis* should be transferred to *Arthraxon* and consequently the new combination *A. australiensis* (B.K.Simon) E.J.Thomps. is made below.

It was found in the process of this study that the usage of terminology in the literature for some of the characters applied to *Arthraxon*, *Thelepogon* and allies is ambiguous. Consequently, some of the terminology was re-appraised in order to enable more consistent and accurate usage (**Appendix 1**). Defining characters and their states more precisely has potential to resolve ambiguity, aid assessment of plasticity and reliability, benefit investigations of homology and homoplasy, and provide better discrimination of taxa in alpha and beta taxonomy (Hillis 1987; Wagner 1989; Smith 1990; Lipscomb 1992; Scotland *et al.* 2003; Wiens 2004; Smith & Turner 2005).

Materials and methods

Taxon sampling

Herbarium specimens of *Arthraxon* spp. and *Thelopogon elegans* held at BRI and on loan from K, including types for *Arthraxon*, were examined. Because *A. castratus* has putatively the closest affinity to *A. australiensis* it was included in the detailed set of character differences presented in **Table 1**.

Plants of *Arthraxon australiensis* were cultivated in pots to study phenotypic plasticity, breeding system and to produce caryopses for future studies. The initial source of caryopses of *A. australiensis* was collected from Hammond Island in May 2016. Caryopses were scarified by scraping off a small portion of pericarp just above the scutellum. Germination was at ambient temperature on damp tissue paper in a covered transparent container in October 2016. Six plants were successfully cultivated in pots under nursery conditions in a well-drained potting medium in Brisbane, Australia (Lat. 27^0 26’ 37”). Plants were watered daily and occasionally fertilised with a commercial pelletised chicken manure. Plants were examined in detail at flowering and fruiting during June 2017. Plants that self-propagated in pots in November 2017 and 2018 were also studied.

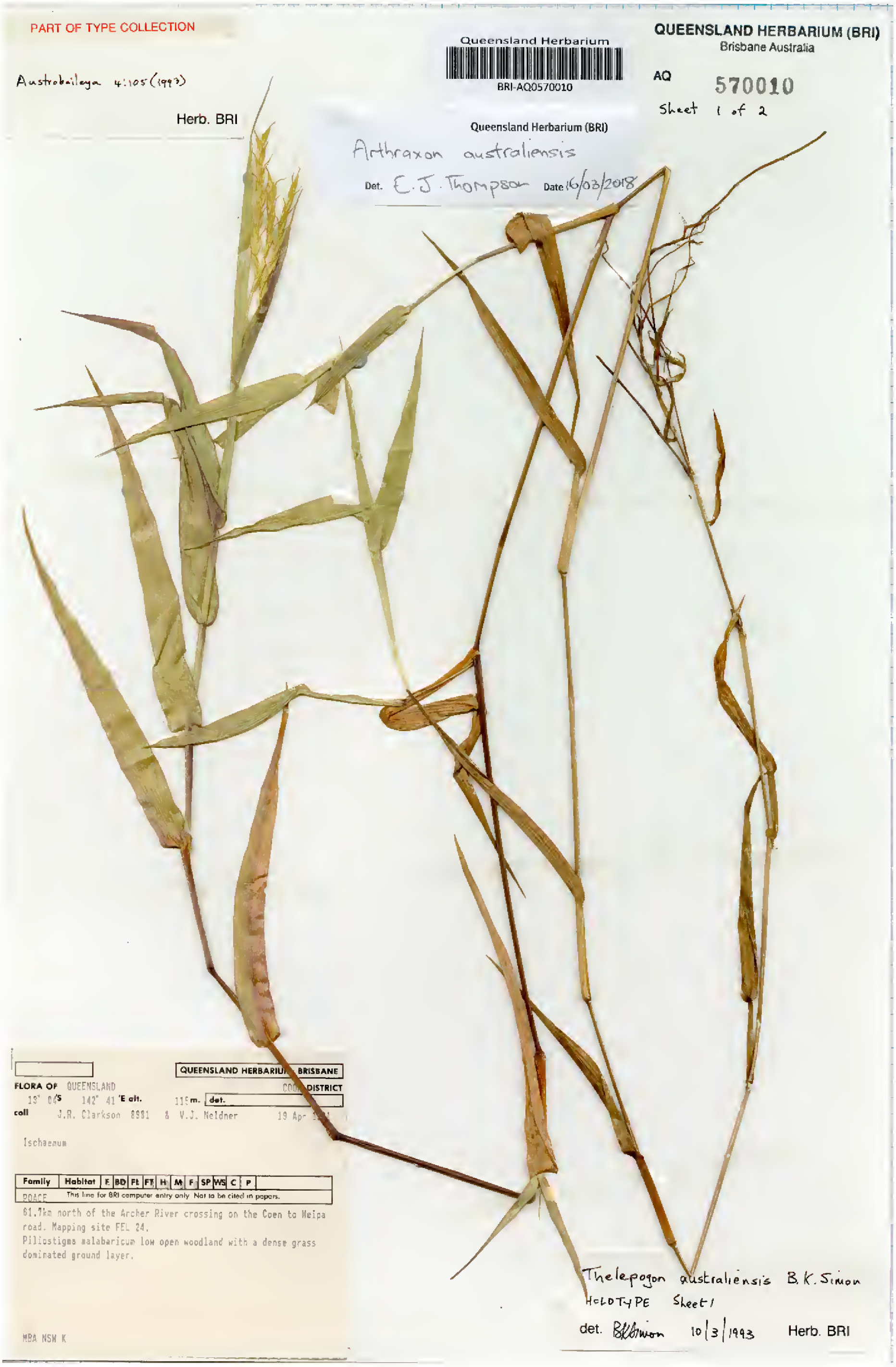
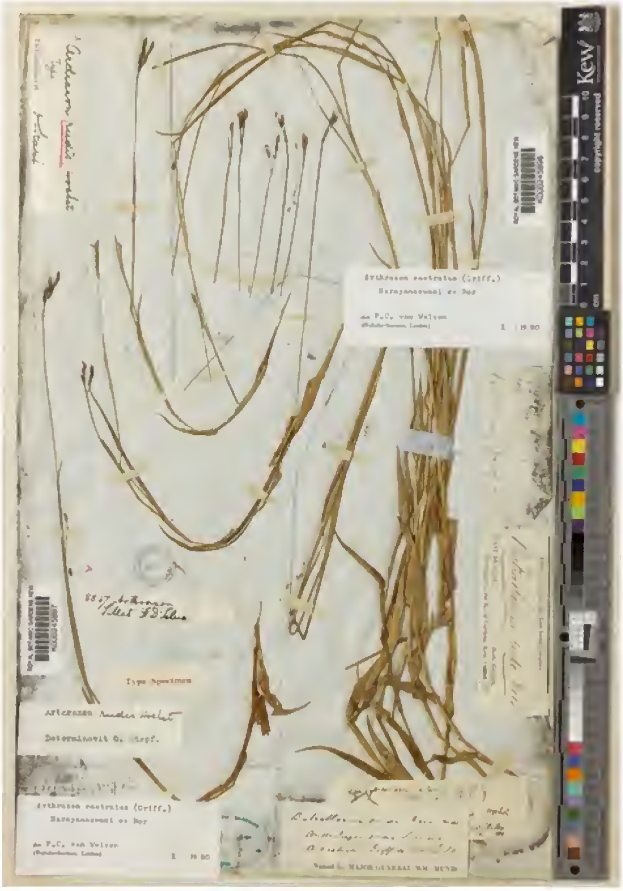
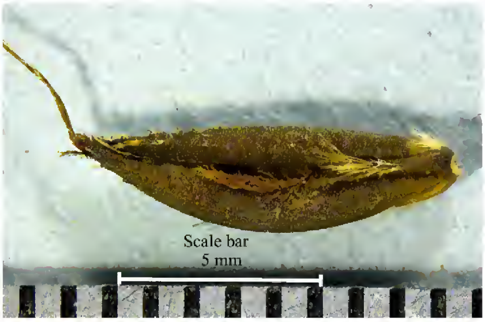

PART OF TYPE COLLECTION
Austrobaileya 4:105 (1993)
Herb. BRI
Queensland Herbarium
BRI-AQ0570010
QUEENSLAND HERBARIUM (BRI)
Brisbane Australia
AQ 570010
Sheet 1 of 2
Queensland Herbarium (BRI)
Arthraxon australiensis
Det. E.J. Thompson Date 16/03/2018
QUEENSLAND HERBARIUM BRISBANE
FLORA OF QUEENSLAND
COOK DISTRICT
13° 04'S 142° 41'E alt. 115 m. det.
coll J.R. Clarkson 8981 & V.J. Neldner 19 Apr
Ischaemum
Family Habitat E BD Ft FT H M F SP WS C P
POACE This line for BRI computer entry only Not to be cited in papers.
61.7km north of the Archer River crossing on the Coen to Weipa road. Mapping site FEL 24.
Piliostigma malabaricum low open woodland with a dense grass dominated ground layer.
MBA NSW K
Thelepogon australiensis B.K. Simon
HOLOTYPE Sheet 1
det. B.K.Simon 10/3/1993 Herb. BRI

Fig. 3. Holotype of ***Thelepogon australiensis*** B.K.Simon (=*Arthraxon australiensis* (B.K.Simon) E.J.Thomps.), (*Clarkson 8981 & Neldner*, BRI). Image: E.J. Thompson.



Holotype of *Andropogon castratus* Griff. (= *Arthraxon castratus* (Griff.) Narayanaswami *ex* Bor.) (*Griffith 292*, K). Image: JStor Global Plants.



Lateral view of spikelet from isotype of *Andropogon rudis* Nees *ex* Steud. (= *A. castratus*) (*Siva 8837*, K). Image: E.J.Thompson.

Fig. 4. Images of ***Arthraxon castratus***.

Table 1. Morphological differences between *Arthraxon australiensis, A. castratus* and *Thelepogon elegans* and those considered significant in the context of subtribes of *Andropogoneae.* Data shown as {bold} are from Simon (1993); all other data in plain text was gathered by the author from herbarium specimens held at BRI. Characters and states in red are considered taxonomically significant at subtribal level.

Character		***Arthraxon australiensis***	***Arthraxon castratus***	***Thelepogon elegans***
Growth habit		geniculately ascending to 70–140 cm high, often rooting at the decumbent nodes; cultivated plants creeping with ascending inflorescence culms to 30 cm high and rooting at some nodes	geniculately ascending to 55 cm high, usually rooting at the decumbent nodes	stout, erect geniculately branching from the base with prop roots, culms to 100 cm high
Leaves	Length × width (cm)	3–13 × 0.5–1.3 {**5–12** × **0.6–1**}	1.5–5.5 × 0.6–1.0	4–18 × 0.7–2.5
	Proximal margins	ciliate with tuberculate-based erect straight simple hairs to 2.5 mm long diminishing in length towards apex of blade; small spicules to 0.25 mm long; micro-spicules to 0.15 mm long {**tuberculate-based cilia**}	ciliate with tuberculate-based erect straight simple hairs to 1.3 mm; micro-spicules *c.* 0.10 mm long; scabrid in upper 2/3 with micro-spicules to 0.2 mm long	ciliate with **spines**, 0.5–0.8 mm long; scabridulous with prickles and hooks
	Adaxial surface	sparsely hairy with erect tuberculate-based simple hairs to 1.6 mm long with medium-sized tubercle base *c.* 0.10 mm wide	sparsely hairy with erect tuberculate-based straight simple hairs to 1 mm long with small tubercle base *c.* 0.05 mm wide	sparsely hairy with two sizes of tuberculate-based erect straight simple hairs to 1.5 mm long with tubercle to 0.16 mm adjacent to the margin and to 4 mm at the margin with large tubercle base *c.* 0.20 mm wide
	Transverse section: Bulliform cells	elliptical in rows of 4–6; large, *c.* 1/2 depth of section	elliptical in rows of 3–4; large, *c.* 1/2 depth of section	elliptical in rows of 2–3; small, *c.* 1/3 depth of section
	Sclerenchyma at mid-vein	abaxial girder, oblong in outline, 3–5 cells high, as wide as vascular bundle; adaxial girder, *c.* rectangular, 3–5 cells high, narrower than bundle	abaxial girder, oblong in outline, 3–5 cells high, as wide as vascular bundle; adaxial girder, *c.* rectangular, 2 or 3 cells high, narrower than bundle	abaxial girder, linear in outline, 2 or 3 cells high, wider than bundle sheath; adaxial strand, linear in outline, 1–2 cells high
	Adaxial epidermal cells	large, *c.* 1/3 width of section section	large, *c.* 1/3 width of section	small, *c.* 1/5 width of section
Inflorescence	Type	1–3 digitate racemes arising terminally {**1–3 racemes**}	1–4 terminal digitate racemes	2–20 terminal subdigitate racemes
	Raceme length (cm)	< 6 {**2.5–5.5**}	< 3	< 10.5
	Peduncle indumentum	pilose with ascending simple hairs to 0.3 mm	pilose with ascending simple hairs to 0.7 mm long	scabrid with prickles to 0.2 mm long
Sessile spikelets	Length × width × breadth (mm)	6.7–8.9 × 1.6 × 1.5 {**6–7** × absent × **1.5**}	4.5–5 × 0.7 × 1.3–1.4	5.4–5.6 × 2.0 × 1.5
	Imbrication	*c.* 50%	*c.* 30%	0%
	Callus hair length (mm)	*c.* 1.3	*c.* 0.4	to 1.7

Table 1. continued

Glumes	Relative length of lower:upper	shorter	shorter	subequal
	Margins	*c.* 40% overlap	40–50% overlap	slightly overlapping
Lower glume	Length (mm)	6–7.3 {***c.* 6.5**}	5	5.4–5.6
	Texture	crustaceous throughout {**indurate**}	crustaceous throughout	crustaceous throughout, a little more indurated than *Arthraxon*
	Compression; transverse section shape	lateral; narrowly convex	lateral; narrowly convex	dorsi-ventral; broadly convex
	Margins	flat (not inflexed) to slightly inrolled distally, texture same as body	flat (not inflexed), texture same as body	flat, texture same as body
	Surface pattern	ridges absent; muricate with variously sized spicules, decreasing in size from top to bottom, conspicuously longitudinally; muriculate with hooks with acute to attenuate curved apices (**finely rugose**); bicellular microhairs *c.* 40 µm long, distal cell > proximal; epicuticular wax film present	ridges absent; muricate in upper half with largest spicules at the apex, longitudinally aligned; muriculate with dense covering of hooks with attenuate curved apices; bicellular microhairs *c.* 25 µm long, distal cell > proximal; epicuticular wax not observed	transversely rugose; muricate with largest spicules towards apex; muriculate with hooks with acute apices and prickles; bicellular microhairs 55–65 µm long, distal cell > proximal; epicuticular wax absent
	Venation	9 (7)–veined	13–veined	7–9–veined
Upper glume	Length (mm)	6.7–8.9	4.5–5.0	5.4–5.6
	Compression; transverse section shape	lateral; more or less v-shaped	lateral; more or less v-shaped	dorsi-ventral; broadly convex
	Texture	chartaceous {**coriaceous**}	chartaceous	crustaceous tapering to chartaceous towards margins
	Surface pattern	not transversely ridged	not transversely ridged	**transversely rugose** along a central longitudinal strip
	Trichomes on back	muriculate with hooks with elongated points; bi-cellular microhairs with cells about equal length	muriculate with hooks with elongated points; bi-cellular microhairs with cells about equal length	muriculate with hooks with short points; bicellular microhairs with cells about unequal, distal cell about twice length of proximal
	Margin	flat, narrowly membranous, cilia to 1.1 mm long in upper half	flat, narrowly membranous, cilia to 0.4 mm long in upper 1/3	**2-keeled**, narrowly membranous to hyaline, glabrous,
	Venation	3–veined	7–veined	3–veined
Lower floret	Composition	barren, lemma only	barren, lemma only	male, lemma and palea with 2-keeled margins
Lower lemma	Length (mm); relative to upper glume	5.0–6.7 {***c.* 4**}; *c.* ¾	3.3–3.8; ¾	5.4–5.6; sub-equal
	Texture	membranous	hyaline	hyaline
	Margins	flat, cilia to *c.* 0.5 mm long	flat, cilia to *c.* 0.4 mm long	2-keeled, glabrous

Table 1. continued

Anthers	Chasmogamous: number & length (mm)	3, 1.8 {**1.2**}	3, 1.4	CH only: both florets: 3, 3.5
	Cleistogamous: number & length (mm)	3, 1.7–2.2	3, 1.3	absent
Upper lemma	Length (mm); relative to upper glume	4.4–5.9 {***c.* 4**}; *c.* 2/3	2.2–2.5; *c.* ½	4.0–4.2; *c.* ¾
	Compression; shape of back	lateral; convex below the base of the awn and 2-keeled above	lateral; convex below the base of the awl & 2-keeled above	dorsi-ventral; convex
	Texture	membranous tapering to hyaline {**membranous**}	membranous tapering to hyaline	hyaline throughout
	Margins	flat, not winged, cilia to 0. 6 mm long	flat, not winged, cilia *c.* 0.3 mm long	flat, glabrous
	Venation	3-veined	3-veined	5-veined
	Apex	2-lobed, *c.* 1/6 of lemma length, acute	entire to minutely 2-lobed, acute	2-lobed, lobes *c.* ½ length of lemma, acute
Lower glume of pedicellate spikelet	Presence	absent or to *c.* ½ length of sessile spikelet; sterile	absent	absent
Awn	Length × width (mm); shape	14–23 × 0.3 {**< 16**}; distinctly geniculate	*c.* 7–11 × 0.1; mostly straight to slightly kinked	to 18 × 0.1; geniculate
	Column length relative to glumes	extended beyond glumes	enclosed within glumes to exserted	extending well beyond glumes
	Trichomes	appressed prickle hairs *c.* 0.05 mm long	hooks	appressed prickle hairs *c.* 0.05 mm long
	Position	**proximal**, arising 0.5 mm from base of the lemma	**proximal**, arising 0.5 mm from base of the lemma	from sinus between lobes at *c.* half total length of lemma
Pedicel	Length × width at centre (mm); relative to sessile spikelet; shape; relative to internode	3–5 {***c.* 3**} × 0.5; *c.* 2/3; linear, strap-shaped; c. as wide and as long as	1–2 × 0.2; 1/3–½; linear, strap-shaped; much narrower and shorter	7.2–11.5 × 0.8; longer; lanceolate, concavo-convex in TS, concavo-convex below apex; distinctly different
	Indumentum	villous on outside with ascending simple hairs *c.* 1.1 mm long increasing in length with distal ones to 2.5 mm long {**villous**}	villous on outside with ascending simple hairs 0.3–0.5 mm long increasing in length width distal ones 1.8 mm long	scabrid along veins, appressed spicules *c.* 0.3 mm long, lacking simple hairs

Table 1. continued

Callus	Width (mm); shape	0.4; circular	0.2; circular	1.2; elliptical
	Indumentum length (mm) & density	< 1.5 mm, dense	0.3–0.5, sparse	< 1.5 mm, sparse
Rachis internode	Length × width at apex (mm); relative to sessile spikelet	3.3–4.5 × 0.4–0.6; *c.* ½	3.0–3.3 × 0.3; *c.* 2/3	4.0–4.2 × 1.0–1.4; *c.* equal
	Shape; longitudinal; transverse section	capitate; narrowly concavo-convex throughout	capitate; narrowly concavo-convex throughout	distinctly clavate; concavo-convex, circular towards apex
	Texture	cartilaginous, slightly hardened	cartilaginous, slightly hardened	crustaceous
	Indumentum at apex	bearded, densely pilose with ascending hairs to 2 mm long	not bearded, sparse to medium pilose with ascending hairs to 0.5 mm long	ascending short hairs, a few cilia to 2.8 mm long on adaxial edge
	Surface	villous with ascending hairs to 1mm long	villous with ascending hairs to 0.5 – 1 mm long	distinct veination with prickle hairs
Caryopsis	Length × width × breadth (mm)	3.7–4.1 × 0.7–0.8 × 1.2–1.3 (not seen)	2.4 × 0.6 × 0.9	3.2 × 1.3 × 0.9
	Compression	**lateral**	**lateral**	dorsi-ventral
	Surface texture	longitudinally undulate, smooth	smooth	flat, finely **longitudinally striate**
	Scutellum length relative to caryopsis	< ½	< ½	*c.* 2/3

Gross morphology

The gross morphological characters and states listed in **Table 1** were obtained by observation of herbarium specimens and online images of specimens, and from descriptions, drawings and keys in the literature (Hooker 1897; Hutchinson & Dalziel 1936; Prain 1917; Clayton 1972; van Welzen 1981; Clayton & Renvoize 1986; Watson & Dallwitz 1992; Davidse 1994; Simon 1993; Simon & Alfonso 2011; Watson *et al.* 2018). Clayton (1972) listed 41 characters and states for species with an awned upper lemma in *Andropogoneae*, including *Arthraxon* and *Thelepogon*, that he used in numerical analyses but did not provide a scored matrix for character states.

Data provided in **Table 1** were gathered by observation of herbarium specimens. A range of herbarium material was examined particularly with respect to maturity of spikelets. For example, spikelets with caryopses were used for assessment of glume texture and immature material was used to observe anthers prior to anthesis. Because the veins on the upper and lower glumes were obscured by the nature of the surface texture, vein number was counted by viewing from the inside.

Micromorphology

Images of leaves and spikelets were obtained using a Nikon SMZ25 binocular microscope with a Nikon DS-Ri1 camera and images viewed using NIS-Elements BR 4.30.00 64-bit. Scanning electron microscope (SEM) images were obtained using a Phenom G2 5kev SEM with backscatter detector, and samples were prepared without sputter coating.

Leaf anatomy

Leaf transverse sections were prepared following Thompson (2017) using freehand sectioning modified from the method described by Frohlich (1984). Several sections from different BRI herbarium specimens were made for each species although only one specimen of *Arthraxon castratus* was available. Samples were rehydrated by initial immersion in hot water and soaked from a few hours to several days. Fresh material for *A. australiensis* was also sectioned. Mature leaves were chosen and sections taken from near the middle of each leaf. Leaf samples were placed on a glass slide covered with a cover slip that served as a cutting guide. Sections were cut using a razor blade while viewing under a binocular microscope at x40 magnification.

Images were obtained using a Leica DMLB compound binocular microscope with an industrial digital camera and images viewed using ToupView.

The descriptions of leaf anatomy for *Arthraxon* and *Thelepogon* by Renvoize (1982) and Watson & Dallwitz (1992) were reviewed and used as a model guide for those here.

Terminology and Nomenclature

Botanical terminology follows Harris & Harris (1994), McCusker (1999) and Beentje (2010) for general usage. Some terms for trichomes on the epidermis of grass leaves as described by Ellis (1979) are used including micro-hairs, macro-hairs, prickle hairs, angular prickle hairs and hooks. Classification of epicuticular wax follows Barthlott *et al.* (1998).

Taxonomic nomenclature is consistent with Bostock & Holland (2018) and Soreng *et al.* (2017).

Results and discussion

This study revealed differences in the following characters for the two species of *Arthraxon* and *Thelepogon*: growth habit, types of trichomes on the leaf margins, anatomy of leaf transverse sections, inflorescence type, glume compression, internode and pedicel shape and size, types of trichomes on the lower glume and surface pattern, margin of the upper glume, composition of the lower floret, position of the awn on the upper lemma, caryopsis shape and breeding system. The differences in the states of these characters for the two species of *Arthraxon* and *T. elegans* and their context in *Andropogoneae* (**Table 1**) are discussed below.

Growth habit

Plants of *Arthraxon* and *Thelepogon elegans* have distinctive differences in growth habit. *Arthraxon* species are slender, trailing to decumbent annuals or perennials usually rooting at the nodes while *T. elegans* is an annual with erect stout stems frequently with prop roots (Hooker 1897; Prain 1917; van Welzen 1981; Cope 1982; Davidse 1994). However, Watson & Dallwitz (1992) described *Arthraxon* as decumbent and *T. elegans* as erect or decumbent. A decumbent growth habit for *T. elegans* was difficult to confirm from herbarium specimens because of incompleteness of material, especially absence of lower portions of culms and bases, and insufficient label information.

Trichomes on the leaves

The various types of trichomes on the leaf margins of *Arthraxon australiensis, A. castratus* and *Thelepogon elegans* are shown in **Fig. 5.** Although both genera have ciliate margins with erect macro-hairs that consist of a transparent hair and an enlarged opaque base, they have distinctive differences. *Arthraxon* species have tuberculate-based hairs comprising a simple hair of varying length that is disjunct, at least when dry, from a somewhat donut-shaped base. *T. elegans* has trichomes with a spine-like hair confluent with an enlarged asymmetric base that is longitudinally flattened. Simon (1993) referred to these trichomes as "tuberculate-based spines". They resemble a very enlarged type of angular prickle hair as described by Ellis (1979) and are very unusual in *Andropogoneae*. They are 0.5–07 mm long whereas the typical angular prickle hairs found on most *Andropogoneae* are less than about 0.05 mm long. These spines have similarities to the trichomes on the leaf margins of some other species in *Andropogoneae* such as *Chrysopogon* Trin. (subtribe *incertae sedis*). *Chrysopogon sylvanticus* C.E.Hubb. has appressed trichomes about 0.3 mm long that also resemble very large angular prickle hairs. The homology of these apparently similar types of trichomes on the leaf margins requires further investigation (*cf.* Snow 1998).

Both genera have micro-hairs on the leaf margins. *Thelepogon elegans* has a dense covering of hooks and occasional angular prickle hairs. The *Arthraxon* species have angular prickle hairs and infrequent hooks.

On the abaxial leaf surface, the two species of *Arthraxon* and *Thelepogon elegans* have similar tuberculate-based simple hairs. All three species differ by the diameter of the tubercle and length and diameter of the hairs.

Leaf anatomy and micromorphology

Species of *Arthraxon* and *Thelepogon elegans* share the C4 photosynthetic pathway with a single bundle sheath (XyMS-) (Watson & Dallwitz 1992) as shown in transverse leaf sections of *A. australiensis, A. castratus* and *T. elegans* (**Fig. 6**). Differences in bulliform cells, adaxial and abaxial sclerenchyma, and adaxial epidermal cells are listed in **Table 1**.

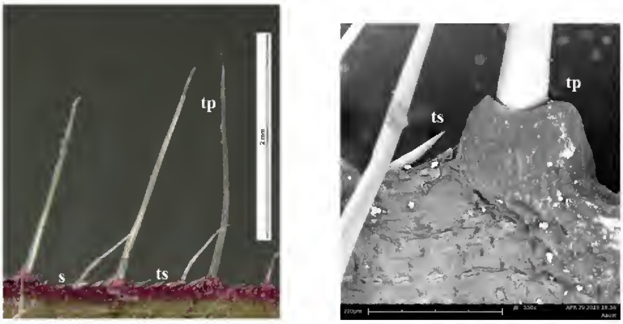
Some of these anatomical findings differ from the descriptions by Watson & Dallwitz (1992). This study found that the primary vascular bundles for *Arthraxon australiensis* and *A. castratus* have combined sclerenchyma girders, whereas Watson & Dallwitz (1992) considered this arrangement absent. *Thelepogon elegans* has adaxial strands and abaxial girders whereas Watson & Dallwitz (1992) described the sclerenchyma as combined girders.

Comparison of fresh and rehydrated sections of *Arthraxon australiensis* show overall strong similarities in anatomical characters except for radiate chlorenchyma that failed to rehydrate adequately enough for the cell pattern to be recognisable.

Examination of bicellular micro-hairs, stomata and silica cells from SEM for this study revealed overlapping variability across *Arthraxon* and *Thelepogon elegans.*

Inflorescences

Arthraxon australiensis, A. castratus and *Thelepogon elegans* have spatheolate inflorescences but differ by the arrangement of the racemes, the longest length of racemes, the imbrication of the spikelets and the indumentum on the peduncles. *Arthraxon*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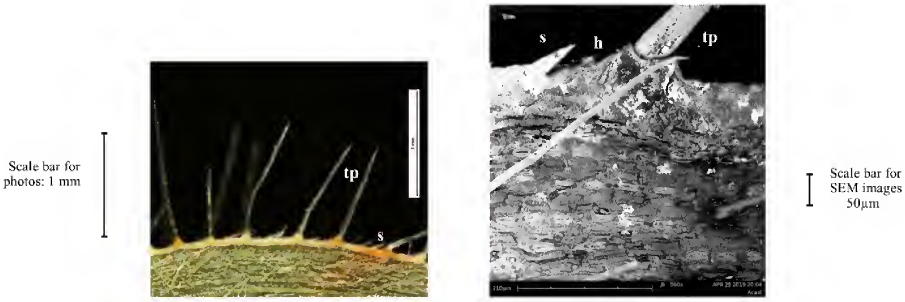
Arthraxon australiensis (both images from *Waterhouse BMW8217*, BRI)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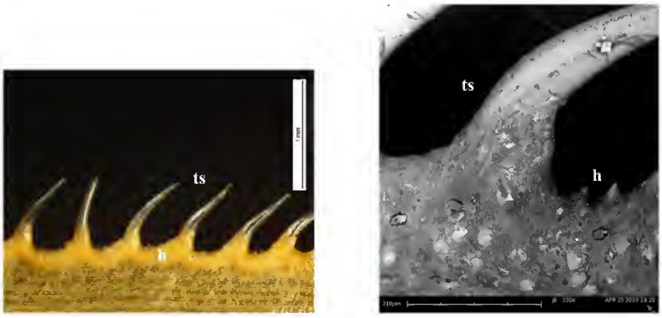
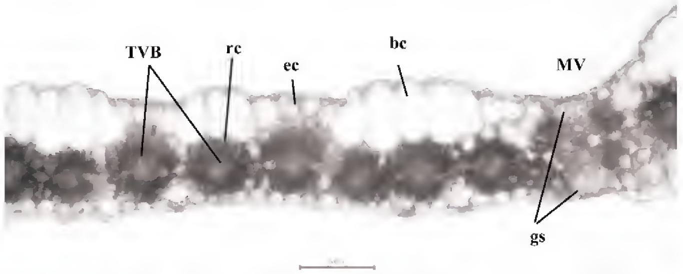
A. castratus (both images from *Simon 4231*, BRI)

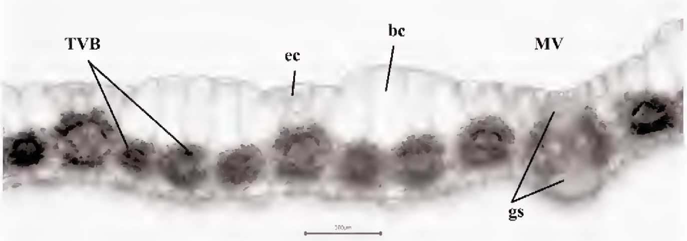


Thelepogon elegans (both images from *Burtt 5679*, BRI)

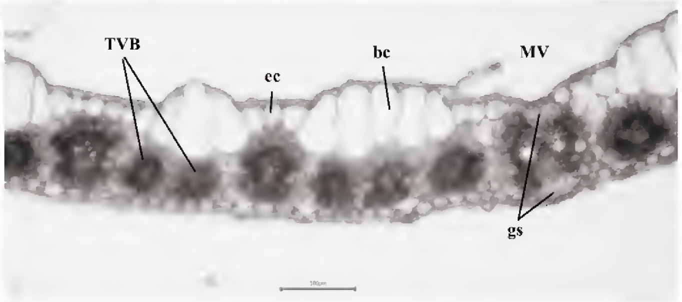
Fig. 5. Types of trichomes on the proximal margin of leaf blade using light microscopy and SEM. **tp** (tuberculate-based simple hair), **ts** (tuberculate-based spicule), **s** (spicule), **p** (prickle), **h** (hook). Images: E.J. Thompson.



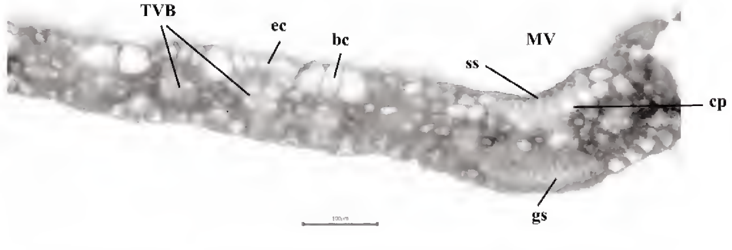
Arthraxon australiensis — from fresh material (*Thompson MOR803*, BRI)



Arthraxon australiensis — from rehydrated herbarium material (*Waterhouse BMW8217*, BRI)



Arthraxon castratus — from rehydrated herbarium material (*Simon 4231*, BRI)



Thelepogon elegans — from rehydrated herbarium material (*Gbile FHI72986*, BRI)

Fig. 6. Transverse sections of leaves. All species have single vascular bundle sheaths. ***Arthraxon*** and ***Thelepogon*** differ by the bulliform cells (**bc**), shape of the girder (**gs**) and strand (**ss**) sclerenchyma at the mid vein (**MV**), and epidermal cells (**ec**). **cp** (clear parenchyma), **rc** (radiate chlorenchyma), **TVB** (tertiary vascular bundle). Scale bars on photos are 100 µm long. All images have adaxial surface upper most. Images: E.J. Thompson.

species have digitate racemes while for *T. elegans* they are mostly subdigitate and the racemes are longer. *Arthraxon* differs from *T. elegans* by the spikelets overlapping along the racemes, and the peduncles pilose with simple hairs and the latter scabrid with prickle hairs.

Sessile and pedicellate spikelets, pedicel and internode (diaspores)

Various differences occur in the composition and compression of the sessile spikelets, the relative shape and size of the rachis internode, the shape and length of the pedicel and indumentum, the presence or absence of a pedicellate spikelet, and the callus shape and size (**Fig. 7**). The lower floret of species of *Arthraxon* comprises only the lemma and is neuter. All species of *Arthraxon* lack a lower palea while *A. australiensis* and *A. castratus* are two of the three species that have an upper palea. *Thelepogon elegans* has both paleas and the lower floret male. Male lower florets are relatively uncommon in *Andropogoneae* although this character is shared by genera including *Sehima* Forssk., also placed in *incertae sedis* by Soreng *et al.* (2017), and some genera in subtribe *Rottboelliinae* Kunth. *Thelepogon elegans,* like some other *Andropogoneae* with the lower floret male, has both lower lemma and palea with 2-keeled margins.

Arthraxon species have internodes and pedicels with relatively similar structure, both more or less strap-shaped (internode slightly clavate) and *c.* half the length and much narrower than the lower glume. These structural features of the diaspore are relatively common in *Andropogoneae* while the characteristics for *Thelepogon elegans* are very uncommon. The internodes and pedicels of *T. elegans* are dissimilar with the internode conspicuously clavate and *c.* half the width and longer than the lower glume, and the pedicel longer than the internode and lanceolate in outline.

Arthraxon australiensis has incomplete pedicellate spikelets differentiated from the sessile spikelets and when present occur in upper parts of the racemes. Pedicellate spikelets are absent in *A. castratus* and *Thelepogon elegans*.

The pedicel indumentum for both species of *Arthraxon* and *Thelepogon elegans* differ in the same way as for the peduncles.

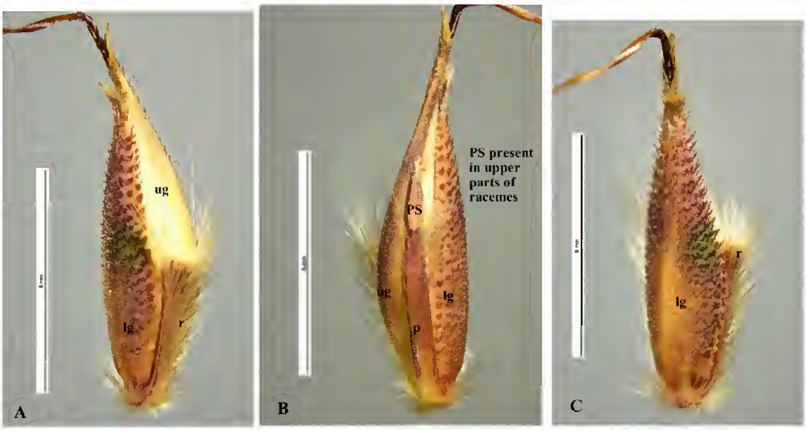
Arthraxon and *Thelepogon* differ in shape and size of the spikelet callus, the former being circular and elliptical respectively, and the latter longer.

Glumes

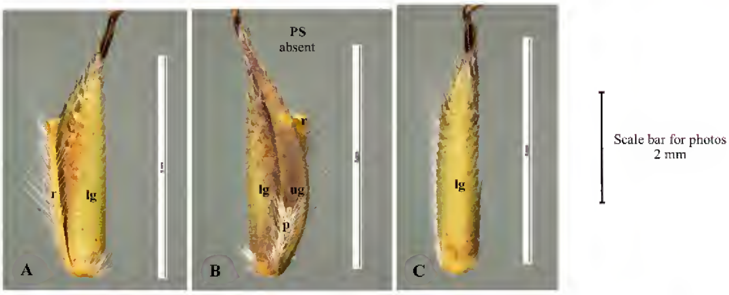
The lower and upper glumes of *Arthraxon* and *Thelepogon elegans* differ by the compression, surface texture, types of trichomes, nature of the margins, presence of epicuticular wax, and relative length. The relative compression of the lower and upper glumes differs for both genera. The glumes of *Arthraxon* are laterally compressed but strongly differentiated in transverse view, the lower glume rounded on the back and the upper glume v-shaped. Conversely, *Thelepogon* has both glumes distinctly dorsi-ventrally compressed. These two combinations of compression of the glumes for *Arthraxon* and *T. elegans* are relatively common amongst other variations in combinations of compression that can be found in *Andropogoneae*.

Arthraxon and *Thelepogon elegans* have a similar relative difference in the texture of the body of the lower and upper glumes. Both genera have the lower glumes indurated and brittle, and the upper glumes leathery to slightly hardened but pliable. Assessment of the texture of the parts of spikelets has tended to vary according to the author. The terminology used to describe the texture of the lower glume of *Arthraxon* has differed, taking into account variation between species (Prain 1917; van Welzen 1981; Clayton 1972; Clayton & Renvoize 1986; Watson & Dallwitz 1992; Simon 1993; Davidse 1994). Combinations of glumes with differentiated or similar texture occur across the genera of the subtribes of *Andropogoneae*.

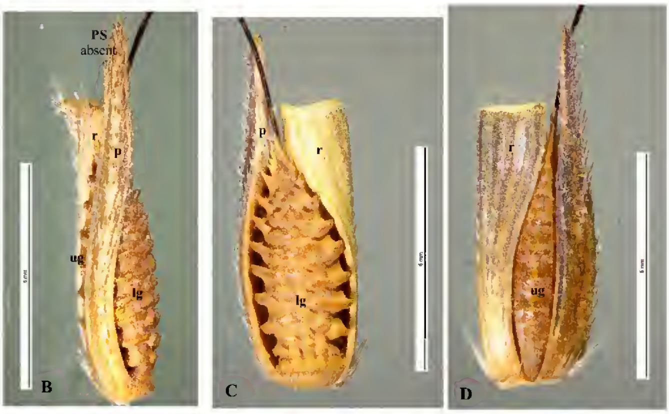
Differences in the trichomes and surface pattern on the lower glumes of *Arthraxon australiensis, A. castratus* and *Thelepogon elegans* are shown in **Figs. 8–10.** All


ug
lg
r
A
PS present in upper parts of racemes
PS
ug
lg
p
B
r
lg
C

Arthraxon australiensis (all three images from *Thompson MOR803*, BRI)

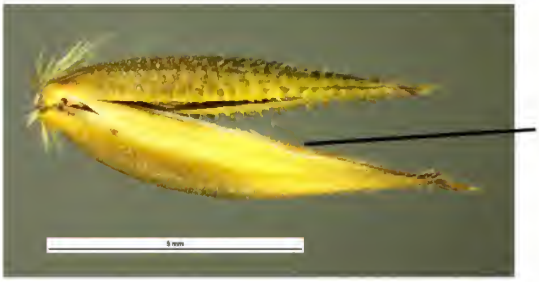

r
lg
A
PS absent
r
lg
ug
p
B
lg
C
Scale bar for photos 2 mm

Arthraxon castratus (all three images from *Simon 4231*, BRI)


PS absent
r
p
ug
lg
B
p
r
lg
C
r
ug
D

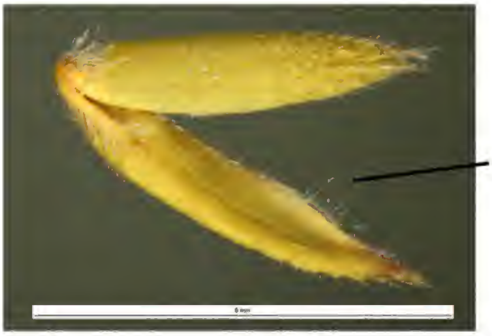
Thelepogon elegans (all three images from *Gbile FHI72986*, BRI)

Fig. 7. Perspective views of the spikelets. Differences between ***Arthraxon*** and ***Thelepogon*** include: compression of lower and upper glumes of sessile spikelet (**lg** & **ug**), shape, size and indumentum of the rachis internode (**r**) and pedicel (**p**). Scale bars on photos are 5 mm long. Views: **A** (lateral), **B** (lateral), **C** (dorsal), **D** (ventral), **PS** (pedicellate spikelet). Images: E.J. Thompson.



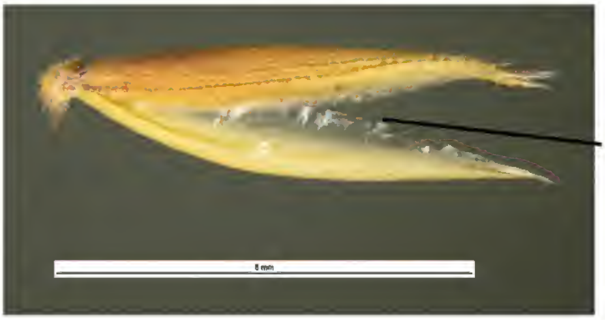
Arthraxon australiensis
(*Thompson MOR805*, BRI)

Upper glume margin narrowly membranous and ciliate



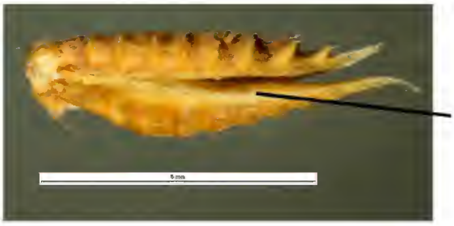
Arthraxon castratus
(*Simon 4231*, BRI)

Upper glume margin narrowly membranous and ciliate



Arthraxon lanceolatus* subsp. *lanceolatus
(*Mitchell 7275*, BRI)

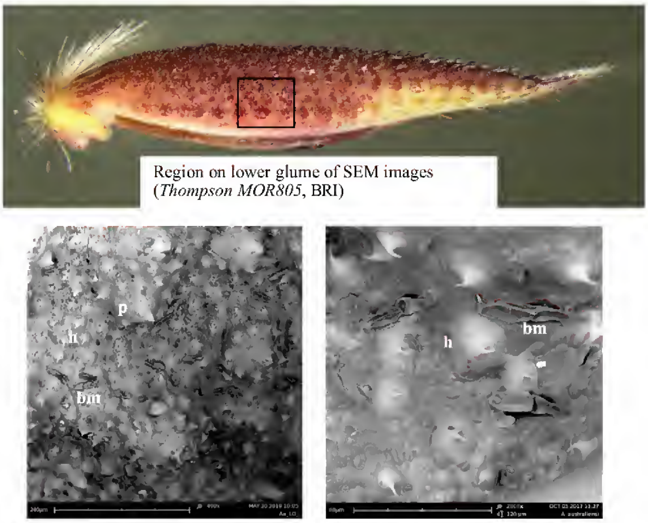
Upper glume margin broadly hyaline and glabrous



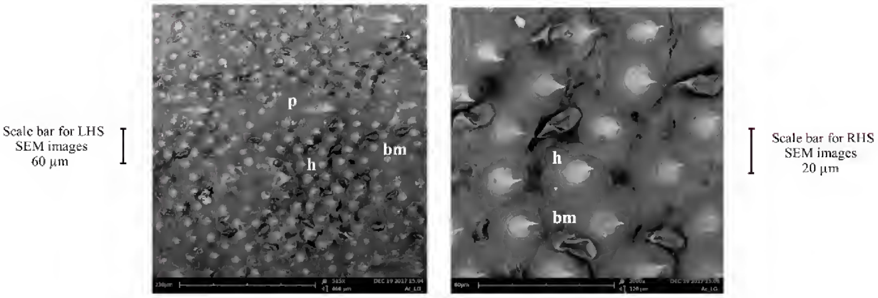
Thelepogon elegans
(*Gbile FHI72896*, BRI)

Upper glume margin narrowly membranous and glabrous with 2-keeled margins

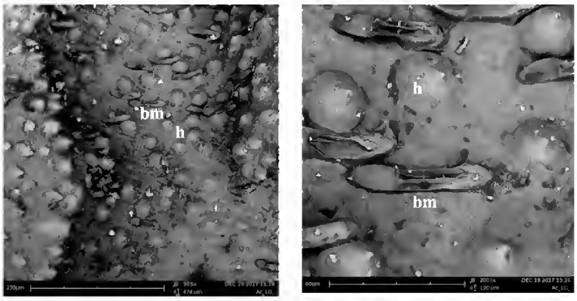
Fig. 8. Lateral view of the lower and upper glumes. Scale bars on images are 5 mm long. Images: E.J. Thompson.


Region on lower glume of SEM images (*Thompson MOR805*, BRI)

Arthraxon australiensis (both images from *Thompson MOR805*, BRI)

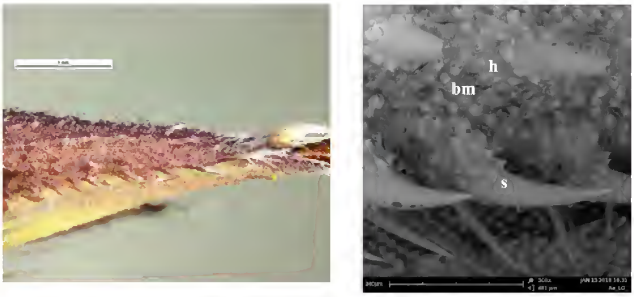

Scale bar for LHS SEM images 60 μm
p
h
bm
h
bm
Scale bar for RHS SEM images 20 μm

Arthraxon castratus (both images from *Simon 4231*, BRI)]

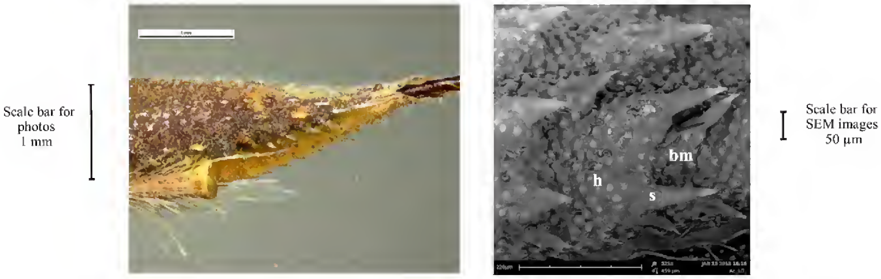


Thelepogon elegans (both images from *Mitchell 5218 & Pane*, BRI)

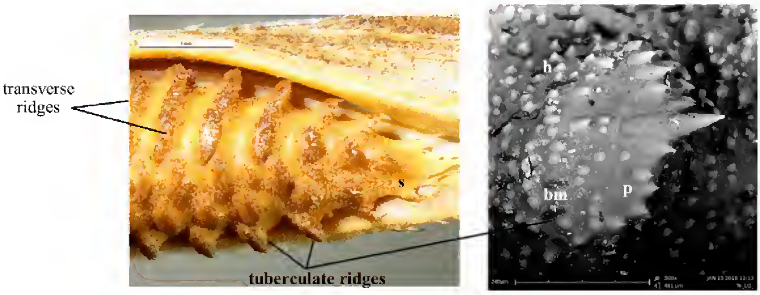
Fig. 9. SEM images at two magnifications of the surface of lower glumes showing types of trichomes and their density. ***Arthraxon*** spp. differ by the hooks (**h**) having elongated points and the bicellular microhairs (**bm**) mostly with the two cells more or less equal length and ***Thelepogon*** with the cells unequal. **p** (prickle). Images captured at *c.* ×500, LHS; ×2000, RHS. Images: E.J. Thompson.



Lateral view of *Arthraxon australiensis* showing tubercle base of spicules adorned with hooks (both images from *Thompson MOR803*, BRI)


Scale bar for photos 1 mm
bm
h
s
Scale bar for SEM images 50 µm

Lateral view of *A. castratus* showing tubercle base of spicules adorned with hooks (both images from *Simon 4231*, BRI)


transverse ridges
s
tuberculate ridges
h
bm
p

Dorsal view of *Thelepogon elegans* showing trichomes on transverse ridges with hooks and prickles (both images from *Gbile FHI72896*, BRI)

Fig. 10. Types of trichomes at the apex of lower glumes using light microscopy and SEM images captured at *c.* ×500. **bm** (bicellular microhair), **h** (hook), **p** (prickle), **s** (spicule). Images: E.J. Thompson.

three species have variously sized spicules increasing in length towards the glume apex. Both species of *Arthraxon* have spicules in numerous longitudinal rows and transverse ridges are absent. *Thelepogon elegans* has small spicules arising from variously discontinuous transverse ridges that occur as tubercles towards the glume apex. *Arthraxon* species have hooks with elongated arched apices and *T. elegans* has hooks with short apices as well as prickles. The characteristics of surface texture of the lower glumes of *Arthraxon* and *T. elegans* are not only dissimilar but are also distinctive in *Andropogoneae*. However, there are some broad similarities with *Jardinia* Steud. (subtribe *Rottboelliinae*).

Authors have variously applied terminology used to differentiate the surface texture of the lower glumes of genera in *Andropogoneae* (**Appendix 1**). The terminology has tended to be a mixture of categories used to describe one or the other of the two components of surface texture being the trichomes and surface patterns. It is contended here that surface texture can be assessed more consistently and definitively using separate categories for trichomes and surface patterns (**Appendix 1**).

The lower glumes of *Arthraxon australiensis, A. castratus* and *Thelepogon elegans* also differ by the presence of epicuticular wax. Film type epicuticular wax was observed on only *A. australiensis*. The lower glumes of both genera have similar bicellular micro-hairs with proximal cells shorter than the distal.

The surface texture and the margins of the upper glume of *Thelepogon elegans* have distinctive differences from *Arthraxon*. The upper glume of genera in *Andropogoneae* has usually been given little attention in descriptions although some authors used a single character such as awned, rugosity (*Thelepogon*) or number of nerves (Clayton 1972; Clayton & Renvoize 1986; Watson & Dallwitz 1992). *Thelepogon elegans* has the upper glume transversely rugose and the margins 2-keeled. Two-keeled margins on the upper glume are very rare in *Andropogoneae* but 2-keeled margins on the lower glume occur in several genera including *Ischaemum* (subtribe *Ischaeminae*), *Sehima* (subtribe *incertae sedis*) and *Thaumastochloa* C.E.Hubb. (subtribe *Rottboelliinae*). *Arthraxon* and many other genera in *Andropogoneae* have the upper glume with smooth surface pattern and flat margins. However, both genera share surfaces that are spiculate apically and muriculate with hooks although *Arthraxon* has long-pointed curved apices on the hooks and *T. elegans* has short points.

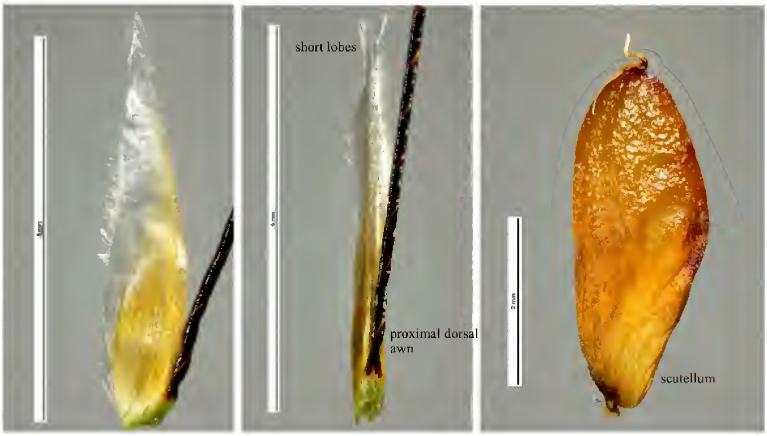
Arthraxon and *Thelepogon elegans* differ by the relative length of the lower glume to the upper glume with lower glume shorter and subequal, respectively.

Upper lemma awn and lobes

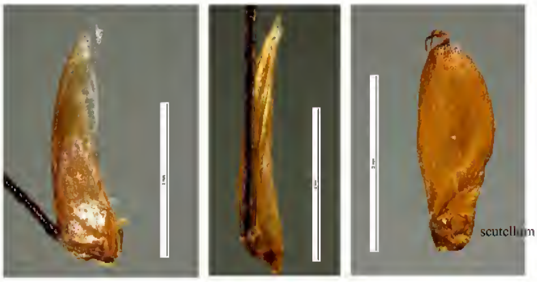
The position of the awn, presence of lobes and compression of the upper lemma for *A. australiensis, A. castratus* and *Thelepogon elegans* is shown in **Fig. 11**. In *Arthraxon* the lobes are fused for most of their length with the awn arising near the base whereas *T. elegans* has lobes about half the length of the lemma with the awn arising at the junction. The proximal dorsal awn on the upper lemma in *Arthraxon* is unique in *Panicoideae* although it can be found in other subfamilies such as *Pooideae* Benth. (Clayton 1972; Watson & Dallwitz 1992; Watson *et al.* 2018).

Caryopsis

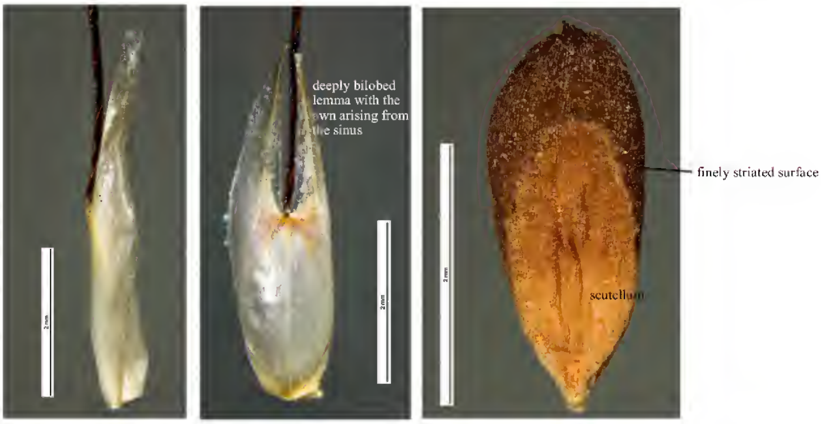
Caryopses of *Arthraxon australiensis*, *A. castratus* and *Thelepogon elegans* are shown in **Fig. 11**. The major differences in the caryopses relate to shape, the relative size of the scutellum and surface texture. Both species of *Arthraxon* have laterally compressed caryopses with scutellum *c.* half its length and surface smooth while the caryopsis of *T. elegans* is dorsally compressed with a larger scutellum and the surface is finely longitudinally striate. Laterally compressed and terete caryopses are very rare in *Andropogoneae* but lateral compression can also be found in *Chrysopogon*. Dorsi-ventral compression is common in the subtribes of *Andropogoneae*. Striate surface of caryopses is very rare in the tribe.


5mm
5 mm
short lobes
proximal dorsal awn
2 mm
scutellum

Arthraxon australiensis (all three images from *Thompson MOR803*, BRI)



Arthraxon castratus (all three images from *Simon 4231*, BRI)


2 mm
deeply bilobed lemma with the
wn arising from
the sinus
2 mm
2 mm
finely striated surface
scutellum

Thelepogon elegans (all three images from *Gbile FH172986*, BRI)

Fig. 11. Lateral and dorsal views of the upper lemma and caryopsis. Top row left and middle, scale = 5 mm; right, scale = 2 mm. Middle and bottom rows, scale bar = 2 mm. Images: E.J. Thompson.

From examination of herbarium specimens and information published in the literature, caryopsis morphology for the species of *Arthraxon* can be divided into two groups, *viz.* terete or laterally compressed with elliptical outline in side view. In his circumscription of *Arthraxon*, van Welzen (1981) described the caryopses as “slightly ovoid-ellipsoid to cylindrical, somewhat laterally compressed” but he did not provide a description of the shape for each species. Davidse (1994) described the caryopses of *A. castratus* as “elliptic in outline, laterally slightly flattened”. On the other hand, Jin *et al.* (2006) described *Arthraxon* as having terete caryopses. *Arthraxon hispidus* (Thunb.) Makino, *A. lanceolatus* (Roxb.) Hochst., *A. lancifolius* (Trin.) Hochst. and *A. microphyllus* (Trin.) Hochst. have fusiform to more or less terete caryopses with smooth surface. Caryopses of *A. depressus* Stapf ex C.E.C.Fisch. and *A. jubatus* Hack. were not seen by van Welzen (1981) nor for this study.

Breeding system

The breeding systems of *Arthraxon* and *Thelepogon elegans* differ with regard to completeness of the florets of the sessile spikelets. Both genera have hermaphrodite upper florets but *Arthraxon* has the lower floret sterile while for *T. elegans* it is male.

All species of *Arthraxon* can have sessile spikelets with cleistogamous upper florets, i.e. self-fertilized within a closed flower (van Welzen 1981), but no cleistogamy has been observed for *Thelepogon elegans*. However, *Arthraxon* was not included in the respective classifications of cleistogamy in grasses by Campbell *et al.* (1983) and Culley & Klooster (2007). From herbarium specimens examined for this study, some species of *Arthraxon* had cleistogamous spikelets present. From cultivated plants, presence and abundance of cleistogamy in *A. australiensis* was found to vary within racemes and from raceme to raceme, sometimes without cleistogamous spikelets or present with low frequency. Applying the criteria presented by Thompson (2017), the type of cleistogamy found in *Arthraxon* is classified as having *monomorphic anthers on the same plants*.

Pedicellate spikelets in *Arthraxon* when present are usually sterile but in three species they are male (van Welzen 1981).

Taxonomy

Arthraxon australiensis (B.K.Simon) E.J.Thomps., **comb. nov.**; *Thelepogon australiensis* B.K.Simon, *Austrobaileya* 4: 105 (1993). **Type:** Queensland. Cook District: 62 km N of Archer River on Coen to Weipa road, 19 April 1991, *J.R. Clarkson 8981 & V.J. Neldner* (holo: BRI [AQ570010, 2 sheets]; iso: CNS [ex MBA], K, NSW).

***Illustration*:** Simon (*loc. cit.* **Fig. 1**).

Additional specimens examined **(all BRI): Queensland.** Cook District: Horn Island, Torres Strait, Jul 1975, *Cameron 2088*; Keriri (Hammond Island), Torres Strait, Residence in Sabatino Village, Jun 2009, *McKenna & Waterhouse SGM 562*; Keriri (Hammond Island), Torres Strait, Sabatino Village, May 2016, *Waterhouse BMW8217.* **Cultivated.** Ashgrove (ex Keriri (Hammond Island), Torres Strait, Sabatino Village), Jun 2017, *Thompson MOR805* (BRI).

***Distribution and habitat*:** *Arthraxon australiensis* is endemic to Queensland and known from Horn and Keriri Islands in Torres Strait and Cape York Peninsula (**Map 1**). Plants have been recorded from the dense grass dominated ground layer of *Piliostigma malabaricum* (Roxb.) Benth. dominated low open woodland at the type locality, or from the banks of granite boulder strewn streams in Torres Strait islands.

***Phenology*:** Flowering and fruiting April-August.

***Affinities*:** *Arthraxon australiensis* is allied to *A. castratus* differing by the presence of pedicellate spikelets at least in the upper parts of racemes, spikelet-pairs with similar appearance of pedicel and rachis internode, and the longer lemma awn.

***Conservation status*:** The species is listed as **Vulnerable** under the *Queensland Nature Conservation Act 1992.*

***Common name*:** Cape York carpet grass.

The following key to the species of *Arthraxon* and *Thelepogon* was adapted from van Welzen (1981).

Key to the species of *Arthraxon* and *Thelepogon*

1 Upper lemma with the awn emanating from between two lateral lobes about equal in length to the lemma body; lower floret of sessile spikelet male with a palea; lower glume crustaceous, transversely rugose, ridges muricate with spicules; upper glume dorsi-ventrally compressed, transversely rugose, margins 2-keeled; caryopsis dorsi-ventrally compressed, finely striate . . . . **T. elegans**

1. Upper lemma with a proximal dorsal awn, i.e. lobes fused except at apex; lower floret barren, reduced to a lemma; lower glume crustaceous or cartilaginous, longitudinally pectinate with spicules; upper glume laterally compressed, not ridged, margins flat; caryopsis terete to laterally compressed, smooth **2**

2 Awn < 2.3 cm long, column smooth **3**

2. Awn > 7.5 cm long, column scabridulous. . . . . **A. jubatus**

3 Glumes of sessile spikelet chartaceous on back; upper glume with broad membranous to hyaline margins *c*. half total width (**Fig. 8**); margins of lower glume inflexed to slightly incurved, wing-like; upper glume and lemmas with glabrous margins; upper palea absent; caryopsis slightly laterally compressed to terete, length/width ratio *c*. 2:1; pedicellate spikelet absent or developed; anthers 2 or 3 . . . . **4**

3. Glumes of sessile spikelet crustaceous on back; upper glume with narrow membranous margins; margins of lower glume flat; upper glume and lemmas with ciliate margins; upper palea present; caryopsis distinctly laterally compressed, width much greater than thickness, length/width ratio > *c*. 5:1 (not seen for *A. depressus*); pedicellate spikelet absent or reduced; anthers 3. . . . . **7**

4 Pedicellate spikelet well developed **5**

4. Pedicellate spikelet absent, at least in lower parts of inflorescence **6**

5 Spikelets < 4 mm long; anthers 3 . . . . **A. lanceolatus**

5. Spikelets > 4 mm long; anthers 2 . . . . **A. microphyllus**

6 Pedicellate spikelets absent . . . . **A. hispidus**

6. Pedicellate spikelets present at least in upper part of inflorescence . . . . **A. lancifolius**

7 Spikelets with a rectangular base, crustaceous; lower glume spiculate **8**

7. Spikelets with a more or less cuneate base, chartaceous; lower glume smooth; India . . . . **A. depressus**

8 Pedicellate spikelet present in at least upper parts of racemes; pedicel *c*. 2/3 length of rachis internode and width *c*. equal to internode; awn 14–23 mm long; Australia . . . . **A. australiensis**

8. Pedicellate spikelet absent; pedicel much shorter and narrower than rachis internode; awn 7–11 mm long; Asia . . . . **A. castratus**

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I am very thankful to Barbara Waterhouse, Danny Mossy and Stephen Amber for herbarium specimens of *Arthraxon australiensis* and Stephen for supplying caryopses. Melody Fabillo and Gordon Guymer provided very helpful feedback on a draft of the manuscript. I greatly appreciate the helpful peer-review comments on versions of this paper by an anonymous referee and Neville Walsh.

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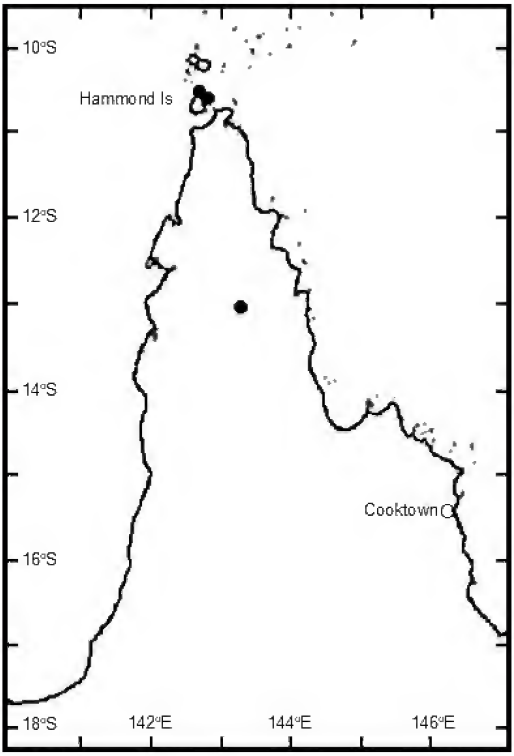

Map 1. Distribution of ***Arthraxon australiensis*** based on BRI specimen point data.

Appendix 1. Terminology used by various authors to describe surface texture on the lower glume in genera in subtribes of *Andropogoneae*. Nomenclature follows Soreng *et al.* (2017)

		Subtribe/genus						
		Arthraxoninae	***Incertae sedlis***	***Ischaeminae***	***Rottboelliinae***			
Author		***Arthraxon***	***Thelepogon***	***Ischaemum***	***Jardinea***	***Hachelochloa***	***Rottboellia***	***Thaumastochloa***
Clayton & Renvoize (1986)		spinulose	rugose	rugose or not	muricate	rugose to cancellate	smooth, areolate, cancellate, rugose	smooth or rugose
Sharp & Simon (2002)		scaberulous, scabrous or rugose	scaberulous, scabrous or rugose	smooth, scaberulous, scabrous or rugose	-	rugose or latticed	-	smooth, rugulose, rugose, cancellate, longitudinally ribbed
Simon & Alfonso (2011)		rugose to prickly (sometimes with lateral rows of tubercles or spines)	strongly rugose, muricate or tuberculate	smooth, transversely rugose, tuberculate on the margins	-	lacunose, rugose	-	smooth, transversely rugose
Watson & Dallwitz (1992)		rugose to prickly (sometimes with lateral rows of tubercles or spines)	strongly rugose, or muricate, or tuberculate	smooth (rarely), rugose (transversely), or tuberculate (on the margins)	muricate to prickly	tuberculate	smooth, lacunose, rugose	transversely rugose or relatively smooth
Watson *et al*. (2016)		rugose, tuberculate, muricate, prickly	rugose, tuberculate, muricate	rugose, tuberculate	muricate, prickly	tuberculate	smooth, lacunose, rugose	smooth, rugose
This study	**Surface pattern**	without ridges	transversely rugose; tubercles ± confluent	without ridges (smooth) or rugose	without ridges	cancellate (longitudinally ribbed and transversely tuberculate); tubercles ± confluent	without ridges, longitudinally ribbed; transversely rugose; longitudinally ribbed and tuberculate in the furrows; lacunose to cancellate with longitudinal and transverse ridges (tessellate)	without ridges or transversely rugulose to rugose with ridges or longitudinally ribbed
	Trichomes	muricate to scabrid with pectinate spicules, and muriculate to scaberulous with prickles and hooks (see **Figs. 7 & 8**)	muricate to scabrid with spicules (see **Figs. 7 & 8**)	glabrous	pectinate spicules	densely muriculate with prickle hairs	glabrous	glabrous to muriculate with prickles

The botanical collections of William Hann's Northern Expedition of 1872 to Cape York Peninsula, Queensland

John Leslie Dowe[1] & Peter Illingworth Taylor[2]

Summary

Dowe, J.L. & Taylor, P.I. (2019). The botanical collections of William Hann's Northern Expedition of 1872 to Cape York Peninsula, Queensland. ***Austrobaileya* 10(3): 506–538.** William Hann's Northern Expedition, 26 June–12 November 1872, was primarily undertaken to explore for gold, minerals and pastoral lands, and to ascertain suitability for settlement in the southern Cape York Peninsula area. In addition to the primary objectives, both botanical and palaeontological specimens were collected. The official botanical collector for the expedition was Thomas Tate who collected on behalf of the Queensland Government under the direction of William Hann. A total of 81 specimens collected by Tate during the expedition have been located. In contrast, an 'unofficial' collection of plants was gathered by Norman Taylor, geologist for the expedition. A total of 68 specimens collected by Taylor have been located. Ten new taxa were established on specimens collected during the expedition. Largely, the expedition remains more of historical interest rather than a significant contribution to the advancement of botany in Queensland.

Key Words: Queensland flora; botanical specimens; early exploration; Ferdinand Mueller; Norman Taylor; Thomas Tate; William Hann

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Introduction

The settlement of Queensland by colonists in the mid-late 1800s was preceded by exploration parties that mainly reported on the suitability for pastoral activities, available resources and potential settlement. Many exploration parties included botanists and geologists amongst their members, as scientific exploration was seen as a way to further understand the capabilities of the country and to legitimise activities with regard to colonial and government expectations. William Hann's Northern Expedition of 1872 to Cape York Peninsula had the object of 'ascertaining, as far north as the 14th parallel of latitude, the character of the country and its mineral resources, with the view to future settlement and occupation' (Hann 1872). The expedition was authorised and partly funded by the Queensland Government, with Hann providing the horses and sheep, and significant personal funds[1]. The party consisted of seven men: William Hann (1837–1889), leader; Dr Thomas Tate (1842–1934), botanist and naturalist; Norman Taylor (1834–1894), geologist; Frederick Horatio Warner (1842–1906), surveyor; William Robert Stewart (known as Peak Downs Stewart), an ex-squatter, Justice of the Peace and magistrate[2]; William Nation (1818–1874), friend of Hann, pastoralist and bushman; and Jerry, an Aboriginal (Ellwood 2014, 2018). They took 25 horses, 20 sheep and provisions for five months (Hann 1873, 1874; Clarke 1982).

This paper examines the botanical significance of the expedition with documentation of the material collected with respect to its distribution to various

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herbaria and identification of species. Themes covering collection attribution, taxonomy, eponomy and the personal relationships of the expedition members are also examined.

Materials and methods

Documents related to Hann's Northern Expedition were located in a number of libraries. Materials in James Cook University and John Oxley libraries were personally examined, whilst items from other libraries were received as digital scans or hard-copy reproductions. Herbarium specimens related to the expedition were located on the available online resources: the primary web sites visited were the *Australasian Virtual Herbarium* (AVH 2019), *JSTOR Global Plants* (JSTOR 2019) and *Kew Herbarium Catalogue* (2019). The databases MELISR [MEL] and HERBRECS [BRI] were examined: the specimens at BRI were personally examined whilst others were received as digitised scans. Trove's digitised newspapers were searched for relevant items (Trove 2019). Herbarium acronyms follow *Index Herbariorum* (2019).

Summary of the Expedition Route

Hann's Northern Expedition commenced at Fossilbrook **(Fig. 1)**, an outstation of Ezra Firth's Mt Surprise Station which was the most northerly extent of settlement (Black 1931), on 26 June 1872, following Fossilbrook Creek until its junction with the Lynd River. The expedition headed north through Kirchner Range before reaching the Tate River. Upon leaving the Tate River heading north, the headwaters of Nonda Creek were met and it was tracked downstream to the Walsh River which was followed meeting the junctions with it of Elizabeth and Louisa Creeks. Heading north, the Mitchell River was met with, and it was explored both upstream and downstream for considerable distances, before the expedition headed north to Garnet Creek and Palmer River. Here members extensively prospected for gold discovering alluvial gold at many locations. From the Palmer, the expedition headed north-west to reach Coleman River and then Stewart River and Princess Charlotte Bay, the most northern extent of the expedition. From here the expedition headed south crossing the floodplains of Kennedy River. Moving to the south-east, the expedition met with the Normanby River which was followed upstream to its headwaters in Normanby Range. The first fall of eastern streams was located in Cunninghams Range, the stream named as Oaky Creek by Hann, a tributary of the Annan River. The Annan River, which Hann mistakenly thought was the Endeavour River, was followed downstream to Walker Bay. Heading south in an attempt to get to Cardwell by a coastal route, the expedition encountered the Bloomfield River and mountains covered in dense, 'impenetrable' rainforest. Thwarted by such a barrier to a southern track, the expedition retraced its route to the north and duly headed west toward drier and open forests. The Laura River (named as the Hearn River by Hann) was met and followed downstream, before a turn to the south-west took the expedition to Palmer River, and more or less tracking on their original route terminated the expedition at Junction Creek Telegraph Station on 12 November 1872[3].

Botanical collections of the Northern Expedition

Surviving documents and notes associated with the specimens indicate that at least three of the expedition party, Hann, Tate and Taylor were involved with collecting botanical specimens (**Fig. 2**). For the expedition, general geology was a primary consideration, in particular prospecting for gold, whilst botany was a secondary consideration. Although the expedition did not find what they considered was payable gold, it is credited with the discovery of gold at Palmer River which, after more thorough exploration (Mulligan 1875), soon after was the subject of a 'rush'[4] and proved to be amongst the largest and most valuable gold deposits in Queensland (Kirkman 1980; Comber 1995).

There appears to have been no formal instructions provided by the Queensland Government with regards to how botanical specimens were to be collected during

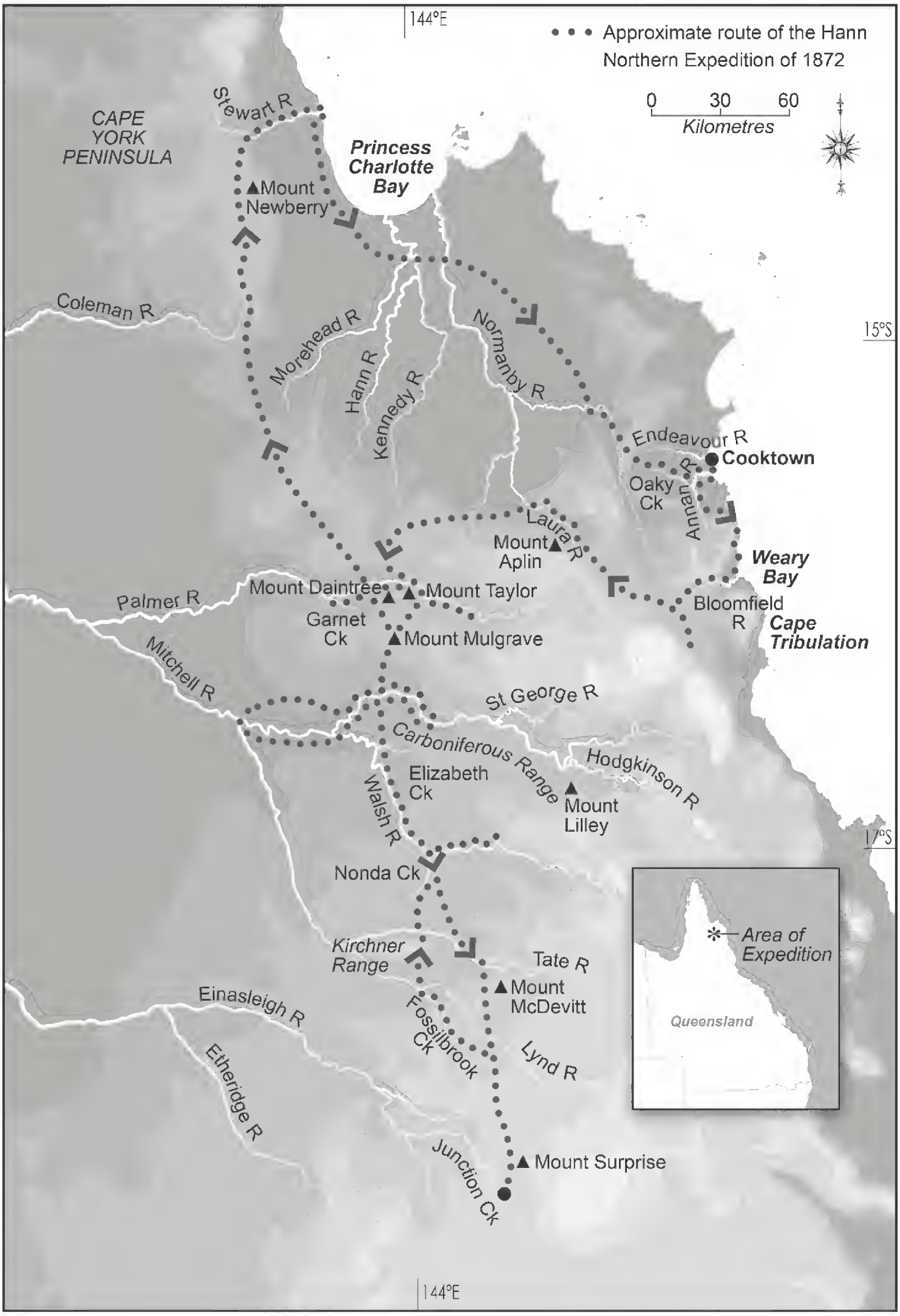

144°E
Approximate route of the Hann Northern Expedition of 1872
0 30 60
Kilometres
CAPE YORK PENINSULA
Stewart R
Princess Charlotte Bay
Mount Newberry
Coleman R
Morehead R
Hann R
Kennedy R
Normanby R
15°S
Endeavour R
Cooktown
Oaky Ck
Annan R
Laura R
Mount Aplin
Weary Bay
Palmer R
Mount Daintree
Mount Taylor
Garnet Ck
Mount Mulgrave
Bloomfield R
Cape Tribulation
Mitchell R
St George R
Carboniferous Range
Hodgkinson R
Elizabeth Ck
Walsh R
Mount Lilley
17°S
Nonda Ck
Kirchner Range
Tate R
Mount McDevitt
Einasleigh R
Fossilbrook Ck
Lynd R
Etheridge R
Junction Ck
Mount Surprise
Area of Expedition
Queensland
144°E

Fig. 1. Map of the approximate route of Hann's Northern Expedition, 1872.

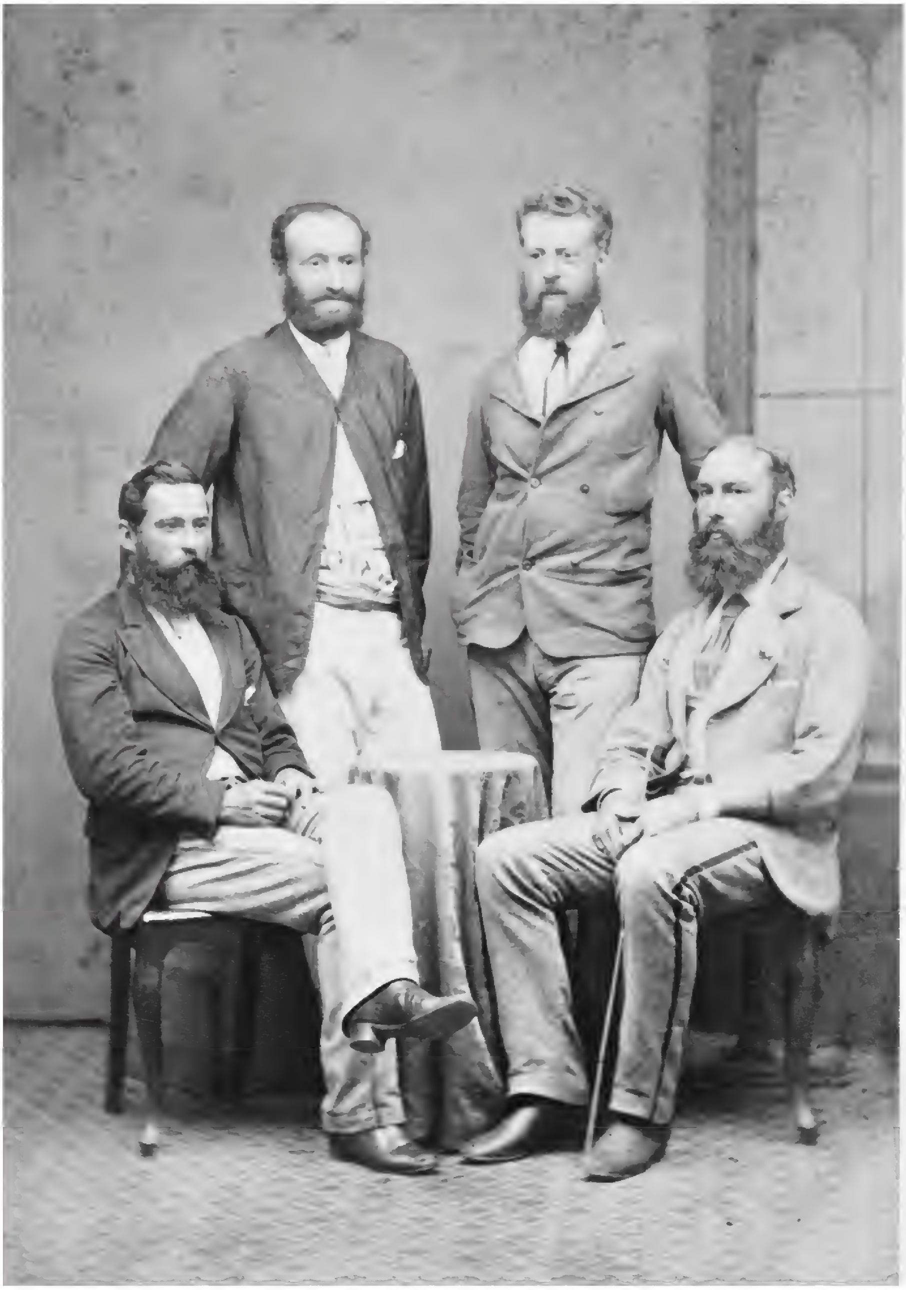


Fig. 2. Four members of Hann's Northern Expedition, *c.* 1872. William Hann (seated left), Frederick Warner (standing left), Thomas Tate (standing right), Norman Taylor (seated right).

the expedition, with the activity under the command of Hann who delegated specifically to Tate as he was nominally responsible for collecting, numbering, labelling, transporting and managing the botanical collections. The specimens collected by Taylor were his sole responsibility seemingly independent of the expedition plan and collected on behalf of Ferdinand Mueller, Victorian Government Botanist. The collections are herein named as the 'Tate specimens' or the 'Taylor specimens', as both sets remained separate and had different outcomes and destinations. Unless specifically recorded as being collected by Hann, specimens with the broad designation of 'Hann's Expedition' or similar are considered here to have been collected by Tate.

The total number of known specimens that were collected by both Tate and Taylor during the expedition is 149. These are housed in the Natural History Museum, London (BM - 1), Queensland Herbarium (BRI - 16), Royal Botanic Gardens Kew Herbarium (K - 65) and National Herbarium of Victoria (MEL - 67). Single photos of specimens in K are held in the Department of Environment and Natural Resources Herbarium, Darwin (DNA) and Western Australian Herbarium (PERTH). The taxonomists who predominantly worked on the specimens or cited them in their works were Mueller (1872–1874, 1875, 1876–1877, 1878–1881), Bentham (1873, 1878), Bailey (1879, 1886, 1899–1902), Baker (1893) and Domin (1914–1915, 1921–1930).

During the expedition, diaries recording their day to day progress and activities were maintained by Hann, Tate and Taylor; however that of Taylor was reported lost soon after the termination of the expedition and has not been located. Information about the expedition is therefore sourced from the records of only Hann and Tate. Annotated extracts, regarding botanical observations, place name etymology and important events, are presented below. From an historical perspective, the botanical collections proved to be overall limited, but some noteworthy additions to the taxonomy of the Cape York flora resulted (**Table 1**). Only minor biographical details are included in this paper, but for extended accounts of William Hann see Black (1931), George (2009) and Bolton (2019); for Thomas Tate see Pearn (2000, 2001) and George (2009); for Norman Taylor see Darragh (1992) and George (2009); and for Frederick Warner see Gray-Wood (2009). Thomas Tate was the cousin of botanist and geologist Ralph Tate (1840–1901), Professor of Natural Science at the University of Adelaide 1875–1901 (Kidman 2013)[5].

The Thomas Tate botanical specimens

Following his departure from England in 1865[6], Thomas Tate spent a number of years in New Zealand before arriving in Melbourne prior to 1870[7]. Previously he had undertaken three years of medical training at the University of Edinburgh and had adopted the title 'Doctor'. He was employed in a number of medical positions, such as ship-surgeon and dispenser, as well as trying his luck at gold prospecting[8]. This latter activity led him to join the 'New Guinea Prospecting Expedition' on the Brig *Maria*, where he was to act as doctor[9]. The *Maria* departed Sydney on 25 January 1872. The intention was to sail to New Guinea to establish a settlement to prospect for gold (Cumbrae-Stewart 1917). However, the *Maria* was wrecked on Bramble Reef to the east of Hinchinbrook Island on 26 February, 1872. Tate was one of about 40 survivors from a complement of about 75 men (Forster 1872; Tate 1903; Rhodes 1980)[10]. Remaining in Cardwell after this event, he came to the attention of William Hann who was then organising the Northern Expedition and Tate was appointed as naturalist and botanical collector for the expedition (Hann 1872; Bailey 1891; Anon. 1918; Ross 2003).

There is no evidence to indicate that Tate had engaged in any botanical collecting in Australia prior to the expedition, and that this was his first experience of such activities in this country. Documents associated with the planning of the expedition do not reveal how or why a dedicated botanical collector was included in the expedition party. It can be deduced that the decision was made by William Hann based on contact with Walter Hill, Queensland's Colonial Botanist. An

Table 1. New taxa described from specimens collected by Thomas Tate and Norman Taylor during Hann's Northern Expedition of 1872. Currently used names are in bold type.

Abutilon hannii Baker f., *J. Bot.* 31: 268 (1893). **Type:** 'Hab. Queensland. Cape York Peninsula Exp., W.Hann, No. 76!' [= *T. Tate 76*] (holo: K 000659610).
Acacia hanniana Domin, *Biblioth. Bot.* 22(89): 807 (1926). (= **Acacia victoriae** Benth.). **Type:** 'Nord-Queensland: Cape York, W.Hann, Cape York Peninsular Expedition No. 59' [= *T. Tate 59*] (holo: K 000791808).
Agapetes queenslandica Domin, *Repert. Spec. Nov. Regni Veg.* 12: 132 (1913) (= **Paphia meiniana** (F.Muell.) Schltr.). **Type:** 'North-Eastern Queensland: Cape York Peninsular Expedition, coll. W.Hann sub. no. 315' [= *T. Tate 315*] (holo: K 000780935).
Bulbophyllum taylori F.Muell., *Fragm.* 8(65): 150 (1874), as '*Bolbophyllum taylori*' [= **Cadetia taylori** (F.Muell.) Schltr.]. **Type:** 'Ad flumen Blomfield's River in silvis densis; Norman Taylor, cui species dicata' (holo: MEL 1540845).
Distichostemon malvaceus Domin, *Biblioth. Bot.* 22(89): 913 (1927) [= **Dodonaea malvacea** (Domin) M.G.Harr.]. **Type:** 'Nordost-Queensland: Cape York, W.Hann, Cape York Peninsular Expedition No. 60, No. 207' [= *T. Tate 207*] (syn: K 000701401, K 000701402).
Lagerstroemia subsessilifolia Koehne, *Pflanzenr.* 17: 267 (1903) [= **Lagerstroemia archeriana** F.M.Bailey]. **Type:** 'Australien: Kap York-Halbinsel (oberer Teil von Mitchell Seed in bag, in bergigem Gebiet, W.Hann n. 47)' [= *T. Tate 47*]' (holo: K 000729689).
Owenia capitis-yorkii Domin, *Biblioth. Bot.* 22(89): 854 [= **Owenia vernicosa** F.Muell.]. **Type:** 'Nord-Queensland: Cape York, W.Hann, Cape York Peninsular Expedition No. 115' [= *T. Tate 115*] (holo: K 000657892).
Pongamia pinnata var. hannii Domin, *Biblioth. Bot.* 22(89): 787 (1926) [= **Pongamia pinnata** var. **minor** (Benth.) Domin]. **Type:** 'Cape York Penin. Expedition. Comm. Queensland Government, Dec. 1873, W.Hann 274' [= *T. Tate 274*] (lecto: K 000618771, *fide* Cooper *et al.* 2019).
Psoralea spicigera Domin, *Biblioth. Bot.* 22(89): 740 (1926) [= **Cullen spicigerum** (Domin) A.E.Holland]. **Type:** 'Nordost-Queensland: Cape York, W.Hann, Cape York Peninsular Expedition No. 40' [= *T. Tate 40*] (lecto: PR; isolecto: K 000217498, *fide* Holland 2013: 140).
Stravadium denticulatum Miers, *Trans. Linn. Soc. Lond.*, ser. 2 1(2a): 88 (1875) [= **Barringtonia acutangula** (L.) Gaertn.]. **Type:** 'In Australia: v.s. in hb. Hook. Cape York (Hann 195)' [= *T. Tate 195*] (syn: K 000761580, BM 001015973).

entry in one of Hann's diaries indicates that he met with Hill in Brisbane in February 1872[11]. The Queensland Government may have anticipated that scientific results would be beneficial, but no documentation to this effect has been located.

Despite Tate's lack of experience, the quality of his specimens (at least of those which survived and have been located) was adequate with most including either flowers or fruit and well-prepared vegetative parts (**Fig. 3**). However, the low number of surviving specimens suggests that drying, packing and transport were not approached with adequate care. Tate's interests during the expedition, as expressed in his own words in his diary, were mostly to do with gold prospecting, Hann's strictness regarding food rationing and natural history rather than botany (Tate 1872). As suggested by Sanderson (2005), Tate 'displayed little scientific enthusiasm'. Examination of his diary reveals only passing references to botanical descriptions or identifications, and he expressed no apparent

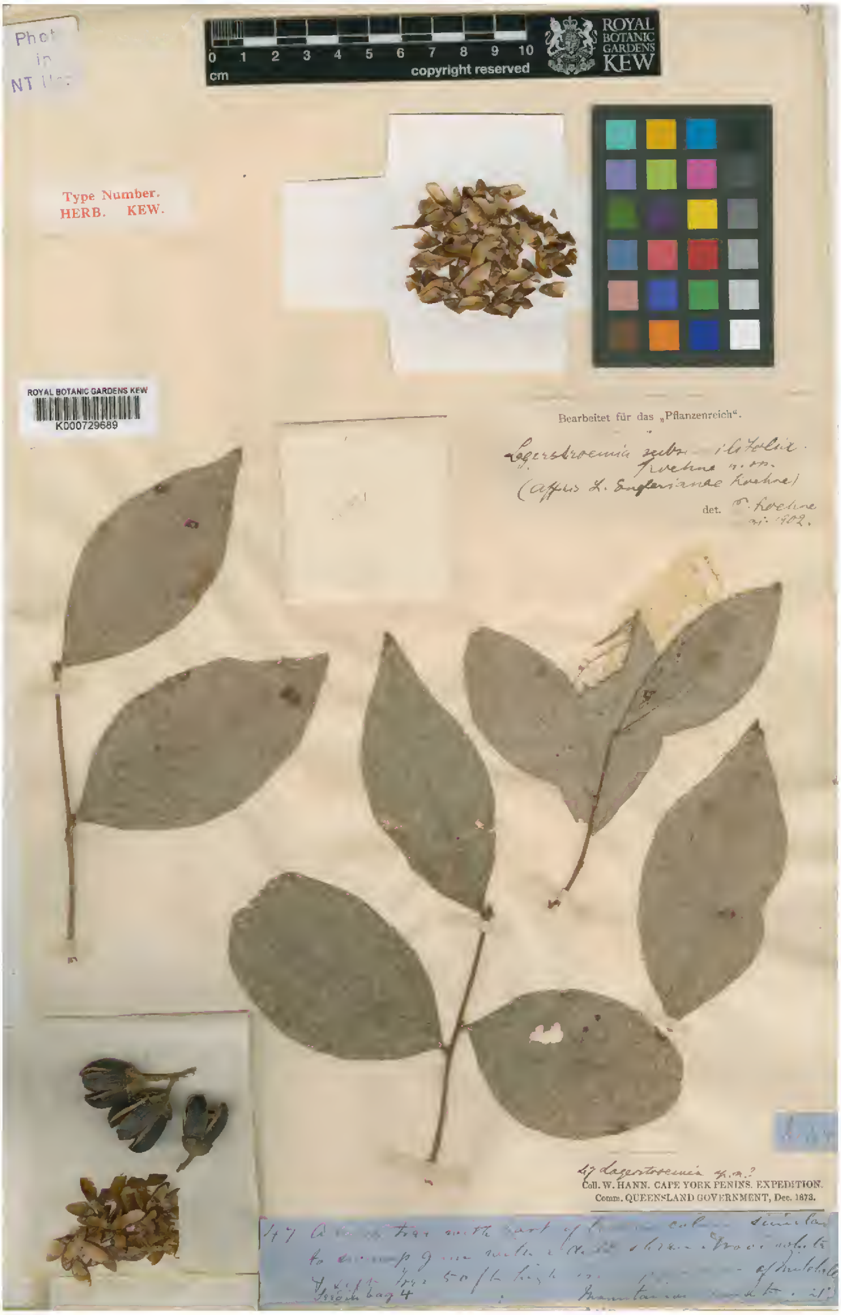

0 1 2 3 4 5 6 7 8 9 10 cm
copyright reserved
ROYAL BOTANIC GARDENS KEW
Type Number. HERB. KEW.
ROYAL BOTANIC GARDENS KEW
K000729689
Bearbeitet für das „Pflanzenreich“.
det.
Coll. W. HANN. CAPE YORK PENINS. EXPEDITION.
Comm. QUEENSLAND GOVERNMENT, Dec. 1873.

Fig. 3. Type specimen of *Lagerstroemia subsessilifolia*, Mitchell River, 21 July 1872, *Tate 47* (K 000729689). Field label reads: 'A large tree with bark of leaden colour similar to swamp Gum with a dull sheen. Wood white & soft Tree 50 ft high from upper part of Mitchell seed in bag 4 mountainous country 21st'. Reproduced with permission from Herbarium, Library, Art & Archives, Royal Botanic Gardens, Kew.

interest in, or knowledge of the botany of the areas through which the expedition travelled.

A scrutiny of the Hann's expedition diaries and subsequent correspondence suggests that the party was a somewhat dysfunctional group of expeditioners, harbouring wilful disagreements and ongoing animosities. Hann clashed with most of the expeditioners at various times[12], and he was noted as having a brash and dominant personality. Both Tate and Taylor (see below) were reported as 'difficult' by Hann during the expedition[13]. Tate was accused of being selfish and self-centred. With regard to food rations, Hann (16 Aug.) wrote, '… both he [Taylor] and the Doctor [Tate] were complaining of not getting enough flour …' (Clarke 1982). He furthermore wrote of Tate's selfishness: '… I spoke rather sharply to him and told him about his always taking more than his share of everything …'. Tate (1872) reported on this situation and noted that 'we had been on half rations, and during the last six or seven weeks of the trip we were glad to eat snakes, lizards, white ants, &c.'. Although Hann was not forthcoming about his opinion of his fellow expeditioners in his official expedition reports, there was little doubt of his opinions of them in his note books and diary. Hann (1872) alluded to them diplomatically:

> there were one or two members of my party who considered exploring monotonous; they ate their suppers and went to bed dreaming of their breakfasts – they rose in the morning, ate their breakfasts, and then passed the day thinking of their suppers! Is comment on such men necessary?

Upon termination of the expedition, Tate spent time at Hann's Maryvale Station arranging the specimens[14] before they were sent to William Henry Walsh, the Secretary for Public Works in the Queensland Government, as accompanying items for Hann's final report and diaries (Hann 1872). There is no mention in Walter Hill's *Brisbane Botanic Gardens Annual Report* (Hill 1873) of him receiving or having seen the expedition specimens in any official capacity and it appears that the specimens were most likely held by the Department of Public Works in Brisbane until they were despatched in early-mid 1873 to Queensland's Agent-General in London, Richard Daintree, who then sent them on to George Bentham at Kew Herbarium. Daintree, a renowned geologist and photographer, had arrived in England in 1871 to curate an exhibition of geological specimens on behalf of the Queensland Government in the London International Exhibition and the following year was appointed Agent-General, a position he held until 1876 (Mozley 1965).

Documentation related to the specimens, held in the Kew archives, includes two letters and three lists of species' identifications. The letters were written by Daintree to Bentham and the lists of identifications were prepared by Bentham and fellow Kew botanist John Gilbert Baker. The specimens were received by Kew in early December 1873 as reported in one of the letters from Daintree to Bentham:

> (9 Dec. 1873) I am instructed by the Minister for Works, to forward these to you, for the purpose of furthering your great work on Australian botany. If after completing your investigation of them, you can make a duplicate set to return to the colony, the remainder could be retained in your herbarium…if there should be sufficient new and interesting forms among the plants now forwarded to you, perhaps you might make them the subject of a short paper, to the Linnean or other Society, so that all the scientific results of the expedition might be known and disseminated through the Colony … the botany of the higher peaks of the Coast Range could not fail to be interesting.[15]

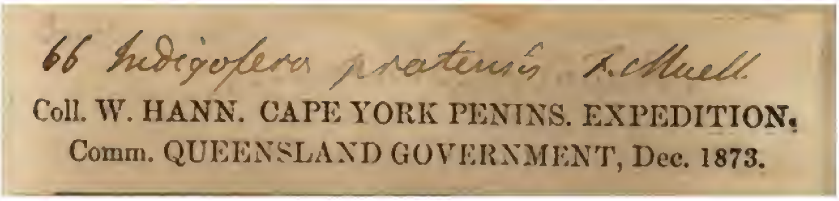
In a response to a letter (not located), presumably from Bentham about the specimens, Daintree replied:

> (16 Dec. 1873) I regret to learn that the collection is on the whole so unsatisfactory that I believe there is no duplicate retained in the Colony, neither do I think this or a duplicate series has been submitted to Baron von Mueller. Under the circumstances I should prefer leaving the matter entirely in your hands. It was made

> in the interest of botanical science, and is at your service. I would suggest however that your proposal to have a list of the specimens made out should be carried out in order that I may send it on to the Colony as I feel sure that Baron Mueller has not anticipated this favour.[16]

The identification lists provided by Bentham and Baker included specimens intermittently numbered 9 through to 379[17]. Because of unaccounted specimens, the total number actually identified by Bentham and Baker, according to their lists, was only *c.* 250 specimens. Of these, about 235 were identified by Bentham and an additional short list prepared by Baker included the names of 14 ferns and monocots only[18]. The discrepancy between collection numbers and actual specimens can most likely be accounted for by damage to, or loss of, individual specimens either in the field or in storage upon return of the specimens to Brisbane. Only 65 specimens are accounted for in the Kew Herbarium Catalogue. Whether this is an indication of the total number of surviving specimens or if the others are not recorded is not able to be determined. It has to be assumed that specimens were discarded, deteriorated or otherwise misplaced over time.

The specimens at Kew all have a printed label ‘Coll. W. Hann. Cape York Penins. Expedition. Comm. Queensland Government, Dec. 1873’ (**Fig. 4**), but do not include the actual collector’s name. The specimens with this label can be unequivocally attributed to Tate as it was his primary responsibility to collect botanical specimens during the expedition. His other responsibilities included naturalist, medical officer and logistics duties. However, some of the specimens have field labels in the hand-writing of both Tate and/or Hann. There is some evidence in Hann’s diaries that he also collected plant specimens for Tate but the specimen numbers appear to be solely in Tate’s hand-writing and observations and descriptions only occasionally in Hann’s hand-writing. It has not been possible to determine who prepared the specimens for despatch from Brisbane to London apart from the ‘Department of Public Works’. It is most likely that the printed labels were prepared in London by Daintree as specimens held in BRI do not have this label. This is also supported by the date on the labels, ‘Dec. 1873’, which is when the specimens arrived in London and does not represent the actual field collection dates (some of which are known) or despatch date (which is unknown) from Brisbane. Many of these printed labels have the species names added in Bentham’s hand-writing (**Fig. 4**). These invariably match with the names in Bentham’s and Baker’s hand-written species lists, both in name and in citing Tate’s field collection numbers. Although Daintree requested that copies of Bentham’s identification lists be sent to Australia, either to Brisbane or to Mueller in Melbourne, there is no evidence of these having been received.



66 Indigofera pratensis F.Muell.

Coll. W. HANN. CAPE YORK PENINS. EXPEDITION.
Comm. QUEENSLAND GOVERNMENT, Dec. 1873.

Fig. 4. Example of the labels on the specimens at K, with species identification in the hand of George Bentham. *Indigofera pratensis*, Palmer River, 12 August 1872, *Tate 66* (K 000217340). Reproduced with permission from Herbarium, Library, Art & Archives, Royal Botanic Gardens, Kew.

Independent to these activities was the communication between Ferdinand Mueller and Joseph Hooker, Director of Kew Gardens, and which related to the Hann Expedition specimens. In correspondence of 25 March 1873, Mueller wrote to Hooker:

> the hon. W. H. Walsh, the Minister of the Lands Department of Queensland, would have sent me a set of Dr Tate's plants from Mr Hann's recent expedition in the extremest N.E. of Australia, had my wish become timely known to the hon. Gentleman. [19]

This suggests that Mueller may have requested from Walsh the specimens, or duplicates of them, for the Melbourne Herbarium. However, he was now making a request to Hooker for a set of duplicates on the assumption that the specimens had been sent to Kew:

> You can easily understand that I am anxious to keep the Australian material for working here as complete as circumstances ever will permit; and I venture therefore to ask you, whether with your usual liberality you will let me have a set of any of the duplicates.

Hooker annotated this letter with the words 'not arrived', thus indicating that the specimens had yet to arrive at Kew but may have still been in transit. Hooker appears to have responded to Mueller (though no letter located) indicating that when available, he will organise a set of duplicates as noted in a subsequent responding letter from Mueller to Hooker of 8 September 1873 in which he wrote:

> It is very kind of you, dear Dr Hooker, that you will send me a set of Dr Tate's plants. It is of course important for me, that I should have here the Australian material for working as complete as possible.[20]

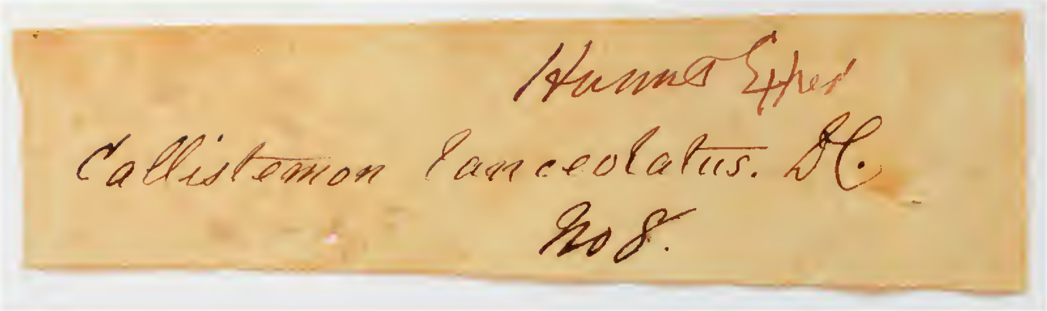
Despite this, there is no evidence that duplicates were sent to Mueller, nor was a list of the species as identified by Bentham and Baker received by him. Pearn (2000) suggested that some of the specimens were returned to Joseph Maiden at NSW in the 1890s, but there is no documentary evidence to support this and no known specimens from this source are presently held in NSW (pers. comm., Shelley James, Collections Manager, NSW).

A small number of specimens (*c.* 16) are presently held in BRI. Most of the labels have the collection number in Tate's hand-writing and label variations such as 'Hann's Expedition', 'Hanns Exped' or 'Hanns Northern Expedition' in what appears to be Hann's hand-writing (**Fig. 5**). At least two of the BRI specimens have 'Brisbane. Museum Herbarium. Queensland' labels (**Fig. 6**). The hand-writing on these is as yet not identified but it appears not to be in the hand of F.M. Bailey. Bailey became officially involved in Queensland botany when the Queensland Museum appointed him as Keeper of the Herbarium in 1874 (Mather 1986). The BRI specimens lack any original field collection labels in contrast to the well-labelled specimens that were sent to Kew.

In 1874, Tate was appointed by the Queensland Education Department as a teacher and took up positions in Oakey, Jondaryan, Rocklea, Pialba, Normanton, Thursday Island and St. Lawrence, before retiring in 1913 to Rockhampton (Viator 1934)[21]. He continued to occasionally collect botanical specimens that are now held in BRI and NSW (AVH 2019). The Tate River (see **Fig. 1**) was named for him by Hann in his report of the expedition (Hann 1872). New species described on specimens collected by Tate are presented in **Table 1**.

The Norman Taylor botanical specimens

Norman Taylor arrived in Melbourne from England in February 1855[22]. He established himself as a respected and diligent geologist in Victoria and New South Wales (Newberry 1867, 1868; Taylor & Thomson 1871; Darragh 1992) and in April 1872 was appointed as geologist for Hann's Northern Expedition[23]. Prior to the expedition, Taylor had some experience as a botanical collector and had provided specimens for Ferdinand Mueller as early as 1867 from the Coliban River/Bendigo area; from the Whittlesea/Mt Disappointment

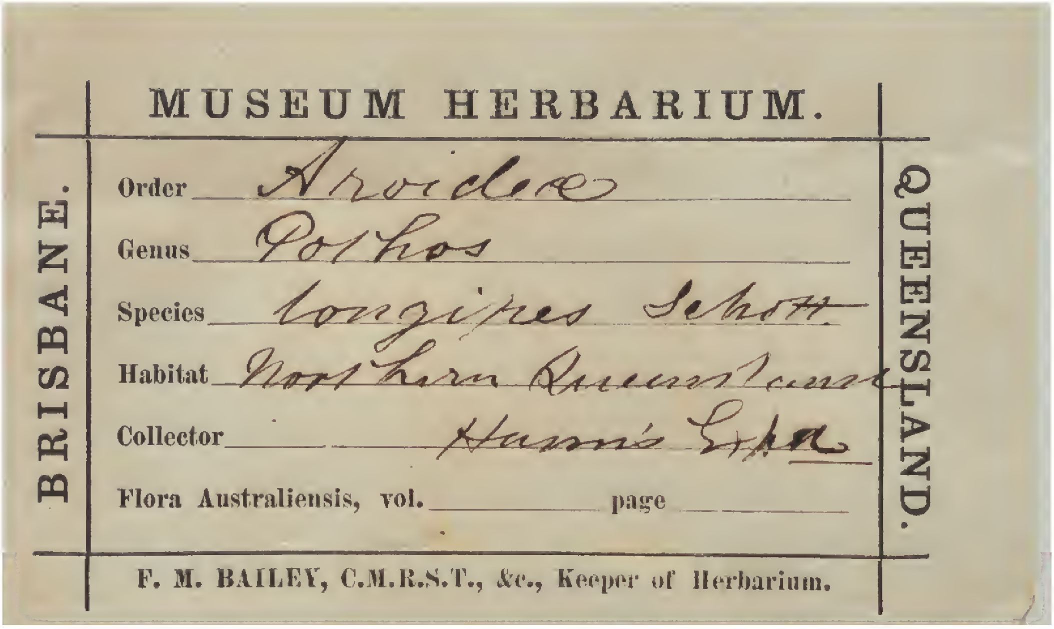


Hanns Exped

Callistemon lanceolatus. DC.

No 8.

Fig. 5. Example of the labels on specimens at BRI, with species identification in an unknown hand. *Melaleuca viminalis*, [Lynd River], *s.dat., Tate 8* (BRI [AQ0418968]). Reproduced with permission from the Queensland Herbarium.



MUSEUM HERBARIUM.

BRISBANE.

Order Aroideae

Genus Pothos

Species longipes Schott

Habitat Northern Queensland

Collector Hann's Expd

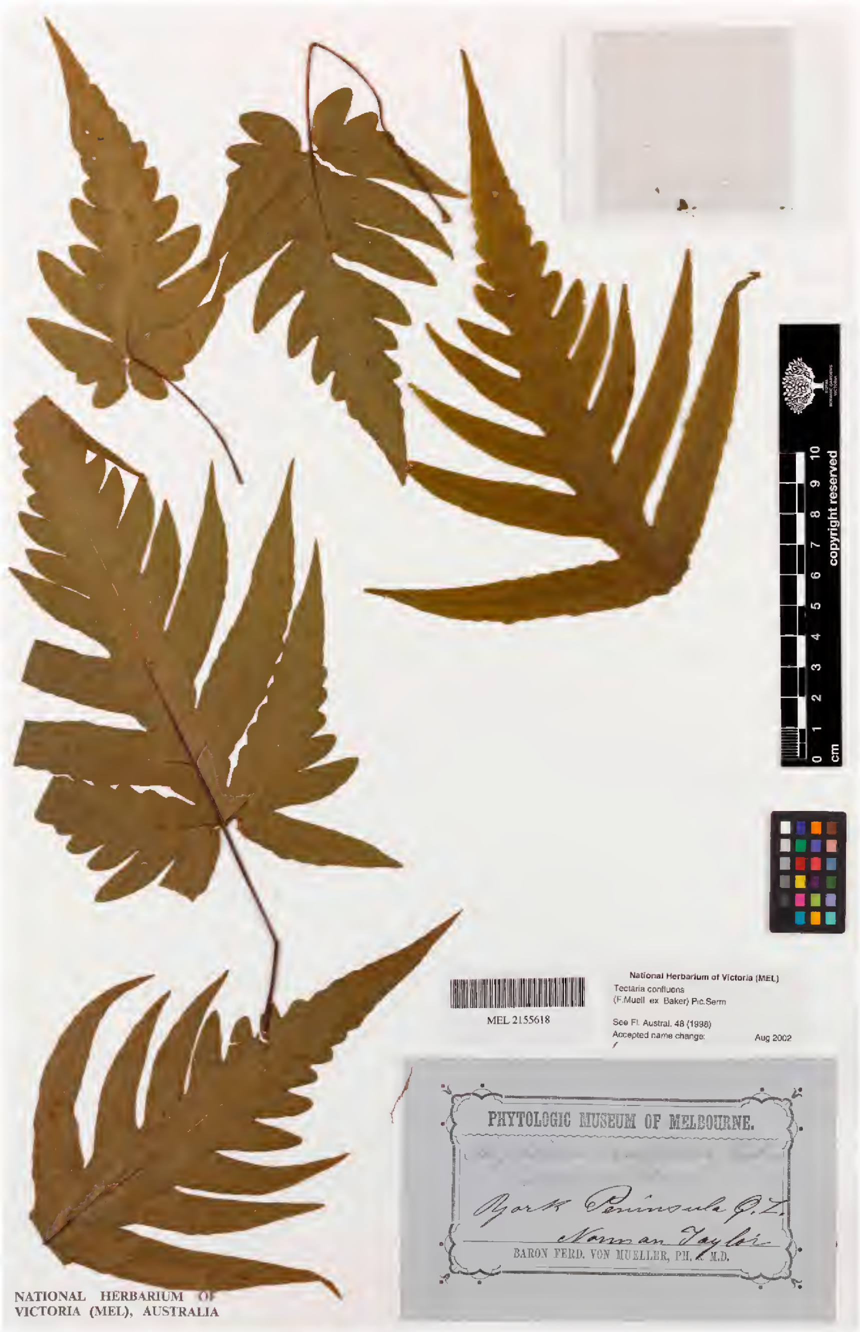
Flora Australiensis, vol. ______ page ______

QUEENSLAND.

F. M. BAILEY, C.M.R.S.T., &c., Keeper of Herbarium.

Fig. 6. One of two Tate specimens with a Museum Herbarium label. *Pothos longipes* Schott, [Annan River], *s.dat.*, *Tate s.n.* (BRI [AQ0431166]). Reproduced with permission from the Queensland Herbarium.

area in 1868; and from the Mudgee area during 1871–72. He made further collections in the Riverina area in 1885. His pre-1872 collections were cited by Mueller in *Fragmenta phytographiae Australiae* and in Bentham's *Flora Australiensis*. The known specimens collected by Taylor during the Northern Expedition amount to 68 exsiccatae (67 in MEL, one in K). These consist mostly of ferns (**Fig. 7**) whilst the angiosperms are mainly specimens of fruit and/or seeds (**Fig. 8**), of which most were supplied in folded paper bags annotated with 'For Herbarium, Norman Taylor' or similar. It is most likely that these were the retained samples of seeds of which the others were possibly used for propagation purposes at Melbourne Botanic Gardens. Taylor's specimens have no original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NATIONAL HERBARIUM OF
VICTORIA (MEL), AUSTRALIA

MEL 2155618

National Herbarium of Victoria (MEL)
Tectaria confluens
(F.Muell ex Baker) Pic.Serm

See Fl. Austral. 48 (1998)
Accepted name change: Aug 2002

PHYTOLOGIC MUSEUM OF MELBOURNE.
York Peninsula Q.L.
Norman Taylor
BARON FERD. VON MUELLER, PH. & M.D.

Fig. 7. Typical fern collection by Norman Taylor from Hann's Northern Expedition of 1872. ***Tectaria confluens***, 'York Peninsula Q.L.', *s.dat., Taylor s.n.* (MEL 2155618). Reproduced with permission from the Royal Botanic Gardens Victoria.

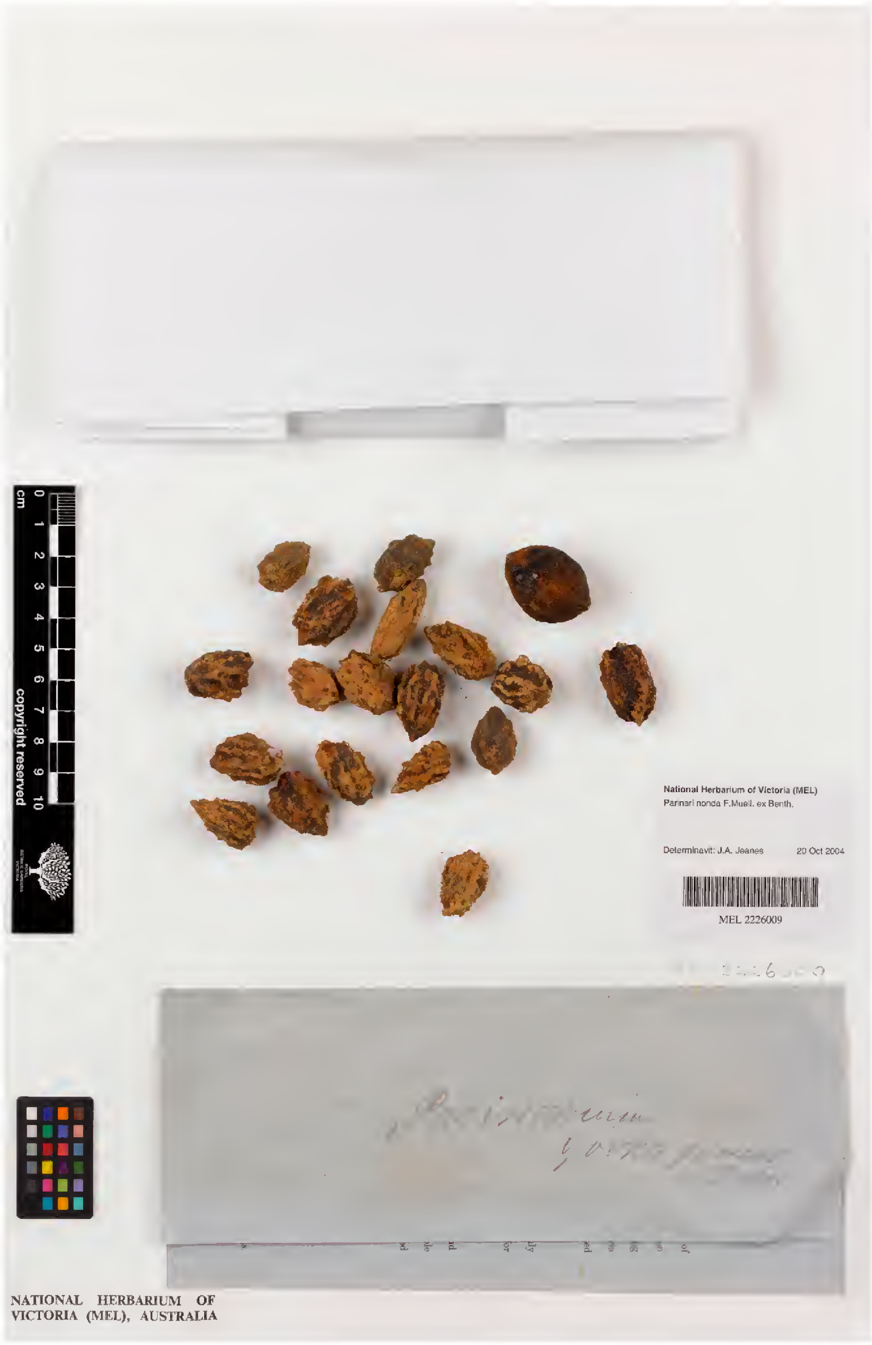
cm 0 1 2 3 4 5 6 7 8 9 10
copyright reserved
National Herbarium of Victoria (MEL)
Parinari nonda F.Muell. ex Benth.
Determinavit: J.A. Jeanes 20 Oct 2004
MEL 2226009
NATIONAL HERBARIUM OF VICTORIA (MEL), AUSTRALIA

Fig. 8. Seeds collected by Norman Taylor. ***Parinari nonda***, 'York's penins', *s.dat.*, *Taylor s.n.* (MEL 2226009). Reproduced with permission from the Royal Botanic Gardens Victoria.

labels apart from minor packet labelling, and many of the extant labels are in Mueller's hand-writing on his printed 'Phytologic Museum of Melbourne' labels (**Fig. 9**).

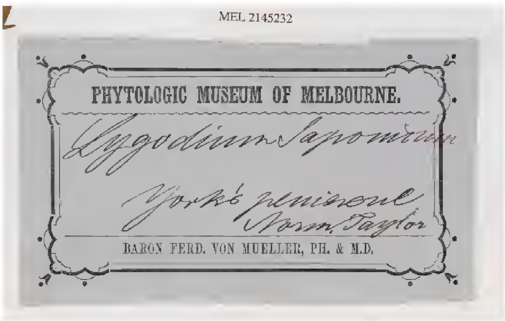
MEL 2145232
PHYTOLOGIC MUSEUM OF MELBOURNE.
Lygodium Japonicum
York's peninsul
Norm. Taylor
BARON FERD. VON MUELLER, PH. & M.D.

Fig. 9. Typical 'Phytologic Museum of Melbourne' specimen label. *Lygodium japonicum*, 'York's peninsul' *s.dat.*, *Taylor, s.n.* (MEL 2145232).

Upon termination of the Northern Expedition, Taylor travelled to Brisbane arriving on the *S.S. James Patterson* on 14 December 1872[24]. It is not known where Taylor joined the voyage, but the vessel called at Cardwell, Townsville, Bowen, Mackay and Rockhampton before terminating in Brisbane. Taylor worked on his geological report whilst in Brisbane, completing it on 31 March 1873 (Taylor 1873). It appears he returned to Melbourne soon after, taking up a position in the Crown-Lands Office (Darragh 1992)[25]. The first published report on Taylor's botanical specimens was published in March 1874 (Mueller 1874a), which included the description of the orchid *Cadetia taylori* (F.Muell.) Schltr. [as *Bulbophyllum taylori* F.Muell.], collected from Bloomfield River, and which was named to honour Taylor. In the same issue, Mueller (1874b) provided a brief account of Taylor's fern collections, which he commenced with '*Amicus Norman Taylor a flumine Endeavour-River vel a regionibus vicinis filices, quae sequuntur, attulit*' [A friend Norman Taylor collected the following ferns from the Endeavour River and its vicinities]. This note implies that they were established friends or at least close acquaintances prior to the expedition. Unusually, a summary of Taylor's collections was provided in an article in the Sydney Morning Herald:[26]

> in the colony of New South Wales the Baron added several new plants to botanical science … to those interesting facts, he [Mueller] adds, the discovery of a new orchid (*Bolbophyllum Taylori*) by Mr. Norman Taylor; … Mr. Norman Taylor has recently sent specimens of ferns from the Endeavour River. They are not new to botanists, but the collection of them is very interesting as illustrating the geographical distribution of those graceful plants. Amongst the most remarkable of those not found in the neighbourhood of Port Jackson are three species of the climbing *Lygodium*; and the curious and variable fern *Ceratopteris thalictrioides*, which grows in pools, salt water not far from the sea, and marshy places. Sir William Hooker, in his *Species Filicum*, has a long account of this strange plant, and he shows that the different forms of it, as existing in Asia, Africa, and America, are really one and the same species. In addition to those, Mr. Taylor collected two species of *Gleichenia*, one of *Davallia*, one of *Adiantum*, three of *Polypodium*, one of *Doodia*, two of *Asplenium*, two of *Aspidium*, and one of *Acrostichum*. Several of these will prove interesting to cultivators of ferns.

Bentham (1878), in his work on the Australian Filices, referenced at least 16 of Taylor's fern specimens from the expedition. Bentham's *modus operandi* was most often to reference specimens that he had personally examined, so it is possible that the specimens in question were examined by him at Kew prior to publication in 1878. None of the Taylor specimens presently held in MEL or K have any annotations in Bentham's hand-writing. Bentham may have been quoting the species listed by Mueller in his *Fragmenta*. Despite this, there is a single specimen in K, identified as *Lindsaea brachypoda* (Baker) Solomon, labelled as a Taylor specimen 'York Peninsula N. Australia Coll. Norman Taylor ex Herb. Mueller 9/77', but whether it was examined by Bentham is not known. A search of correspondence has not revealed any despatches or receipts between Mueller and Kew concerning Taylor's fern specimens and it remains unresolved if Bentham personally examined any Taylor specimens.

Taylor's geological and palaeontological collections from the expedition are the subject of current research by other authors and will not be addressed here in detail. However, of interest are the reports on the geological results that were prepared by Clarke (1873), Taylor (1873) and Jack (1921). There were no references to botanical collections in those reports although Taylor noted his disapproval of Hann who later took 'possession' of both his geological collections as well as Tate's botanical specimens[27]. In addition, Taylor's contribution to surveying and geological collections was not attributed to him by Hann in a number of accounts[28]. Taylor (1873) wrote:

> I may mention here, in connection with this subject, that these fossils were taken from my possession in Brisbane, unpacked and repacked several times by Mr. Hann, thereby adding to the damage they had already received by travelling several hundred miles on pack-horses, and were sent to Sydney with a letter stating that they had been collected by Mr. Hann. I myself had collected fully one half [of the geological specimens], the rest being obtained by the other members of the party, and, as Geologist to the Expedition, I considered that all the fossils were mine, fully as much as that the botanical specimens collected by myself and others belonged to Dr. Tate as Botanist.

As noted above, there was considerable disharmony amongst some members of the expedition, but in particular between Hann, Taylor and Tate[29]. Hann accused Taylor of being inattentive and grossly careless and wrote in his diary following the straying of horses and later the sheep under Taylor's watch: 10 Aug 'In the evening I remonstrated with Taylor showing him the folly of letting the horse go in the manner he did and the trouble it had given me to get him'. Hann continued: 16 Aug 'warnings appear to have little effect on him; I was compelled on a former occasion to speak sharply with respect to fire …' and ' both losses [horses and sheep] had occurred through carelessness'. Hann received criticism about his handling of the expedition. Taylor wrote a somewhat diplomatic letter of support, noting that Hann conducted himself 'in every way as a careful explorer, and thorough Bushman' and noted 'the able assistance you afforded me in my descriptions of Geological specimens obtained by you on your various divergent expeditions'[30]. Later, Taylor expressed an extremely negative opinion of Hann in a letter of a more private deliberation to Rev. W.B. Clarke on 18 Sep 1873 (Moyal 2003: 973):

> What I object to in your address is the way in which Hann is spoken of. You speak of him as a gentleman! of reasoning capabilities. Do you know that this so called gentleman was some years ago nothing more than an uneducated bullock driver …Hann's marriage[31] … gave him a rise in social status … now a Queensland squatter & J.P. – the latter qualification he is eminently unfit for … the geological remarks in his diary were all obtained from myself …this ignoramus contradicted me on all occasions & the result was endless quarrelling. I could not stand his impertinence, especially coming from a man who cannot write & barely read.

Taylor later wrote that the geological results from the expedition were rendered worthless because of the loss of his diary. He wrote to Rev. W.B. Clarke on 26 Feb 1874 (Moyal 2003: 1017):

> Staiger [Karl Theodore Staiger, Custodian of Queensland Museum] tells me that my diary of the Expedition has been lost – another sample of their treatment. As it contains the references to all the rocks etc. brought down with numbers corresponding with those on the specimens, of course the specimens are now valueless, unless I

> were to go over my original journal & send them particulars, which I certainly don't feel inclined to do. I am heartily sick of the name of the Expedition & all to do with it.

Although only one new species was described from Taylor's fern specimens (**Table 1**), they nevertheless represent an exemplary collection, especially of the Pteridophyte flora of the area between the Annan and Bloomfield rivers. Mount Taylor (**Fig. 1**) was named for him by Hann, the name appearing in the text as 'Taylor's Peak' but on the map accompanying Hann's report of the expedition as the former (Hann 1872).

Botanical observations made during Hann's Northern Expedition

The extracts presented here were taken from first-hand accounts of the expedition provided by William Hann and Thomas Tate. It is of interest to note that some passages are identical in some of the texts, which indicates that Hann and Tate viewed each other's reports but who 'borrowed' from whom cannot be ascertained. Consulted works include the following:

[H1] – Hann, W. (1872). *Report from Mr. W. Hann, leader of the Northern Expedition party*. James C. Beal: Brisbane.

[H2] – Hann, W. (1873). *Copy of the diary of the Northern Expedition under the leadership of Mr. William Hann*. James C. Beal: Brisbane.

[H3] – Hann, W. (1874). Hann's Expedition in northern Queensland. *Proceedings of the Royal Geographical Society of London* 18(1): 87–107.

[H4]: Handwritten notebook held in James Cook Library, Townsville.

[H5]: Handwritten notebook held in James Cook Library, Townsville.

[H6]: Handwritten notebook held in James Cook Library, Townsville.

[T1]: *Diary of Thomas Tate 26 June – 10 November, 1872*. Mitchell Library reference number: C 723. Transcribed by Margaret Ross (Ross 1989).

The texts from the Hann's note books have been transcribed by Clarke (1982). With regards to the hand-written diary and the published *Copy of the diary of the Northern Expedition*, there are significant differences between them. The designation of the published *Copy of the diary* as a true copy of his diary is misleading. One of the note books contains rough hand-drawn maps of the route of the expedition with some minor notes on most pages. Tate's sole account is a handwritten report held in the Mitchell Library, and this has been transcribed by Ross (1989).

The botanical observations are mostly broad descriptions of vegetation types, and with an occasional brief description of individual plants that were of interest to either Hann or Tate. Descriptors for forest types included terms as simple as forests of stringybark, ironbark, bloodwood, box, tea-tree, etc., with no attempts to distinguish individual species or to provide names. The species collected for each section were determined by specimen number sequences or the location written on the specimen labels. It is accepted that Tate's specimens were numbered sequentially throughout the expedition. For unnumbered specimens this cannot be ascertained with any certainly but are placed within the section where the habitat for the individual species was most likely for it to occur. However, caution is required in this interpretation. Notes and references concerning place name etymology are also provided. Specimens known to be types are dealt with in **Table 1** and indicated as # in the lists of species collected from each locality.

Annotated extracts

June 26–July, 1872

Fossilbrook Creek to Lynd River [Camps 1–6]: … on the 26th June, all being in readiness, the final start was made from Fossilbrook, the party consisting of – Mr. William Hann, leader; Mr. Taylor, geologist; Dr. Tate, botanist, &c.; Mr. Warner, surveyor; Mr. Stewart and Mr. Nation, members of the party; Jerry, blackboy, with twenty-five pack and saddle horses, twenty sheep, and five months' supply of flour, tea, sugar, and other necessaries [H1, H3] …[Fossilbrook] is wrongly named, for it possesses no fossils; but running over a limestone bed, some might take it for small fossil remains of the coral species [H2] … [along Fossilbrook Ck] basaltic forest country, timbered with ironbark and bloodwood, and the latter four miles, of sandy stony ridges with tea-tree [H2] … over a flat country covered with reeds and rushes intermixed with grass [H1, H3] … this creek has been named Hacketts [Fulford Ck], after the leader of a prospecting party who explored this part in their search for gold about 2 years ago[32] [T1] … the timber and grass change in character, the ironbark and bloodwood of the former is replaced by the tea-tree and other trees common to a sandy soil [H1, H3] … of plants today I saw no great variety – two or three Owenias, a gossypium and a beautiful Lauranthus were the most notable [T1] … the [Lynd] river here is a wide, sandy, and stony bed,[33] cut up into numerous channels, the ground between them being overgrown with tea-tree and shrubs of various descriptions, forming excellent cover for troublesome natives [H2] … banks of [the Lynd River] which were covered with tea-trees and shrubs [H3] … this morning we ascended the highest peak of the Kirchner Range[34] [T1] … on our return I procured several peculiar plants [T1] … a most notable feature on the river [Lynd R], and which I have named Gregory's Bluff[35] [H2] … followed up a creek [Pinnacle Ck ?] in a gap of the Kirchner Range, on a northerly course over quartz ridges with open forest and good-looking country for gold, the timber – iron-bark, bloodwood, and apple-gum, with patches of stringy-bark [H2] … tomahawks had to be brought into requisition to clear a way through the scrubby timber growing on these ridges [H3] … undulating country covered with box, bloodwood and occasionally stringy bark [T1].

***Species collected*:** *Adenanthera abrosperma* F.Muell. (Mimosaceae) (*Tate 10*, *s.dat.*, 'R. Lynd', K 000756981); *Melaleuca viminalis* (Sol. ex Gaertn.) Byrnes (Myrtaceae) (*Tate 8*, *s.dat.*, BRI [AQ0418968]); *Pavetta australiensis* Bremek. (Rubiaceae) (*Tate 16*, *s.dat.*, BRI [AQ0200062]); *Streptoglossa adscendens* (Benth.) Dunlop (Asteraceae) (*Tate 9*, 27 Jun 1872, 'R. Lynd', K 000974730).

July 6–7

Tate River [Camps 7–8]: … struck a large sandy river coming from the south-east, which I have named the Tate[36] [H2, H3] … struck the head of a creek, which was followed – it having high sandstone ridges, on the left bank, which were covered with small stringy-bark timber [H2] … I lost my pint pot. Called this creek Pint Pot[37] [H6] … traced the creek – named Pint Pot Creek – to its junction with a river of considerable size running to the westward. This river – named the Tate after the botanist of the Expedition[2] [T1] … view to the north, shewing level country, as also some peaks in the same direction, which I have named Warner's Peaks[38] [H2] … [at Tate River] found a new tree of the Myrtaceae order. The general appearance of the tree is very handsome, with dense fresh green foliage and affording beautiful shade. The leaves which grow in pairs are 6 to 7 inches long by 4 wide. A vein runs round each leaf near the margin giving it a double appearance. There is also a small flange on either side of the base of the leaf stalk. The tree is deciduous with a bark like box [possibly *Planchonia careya* (F.Muell.) R.Knuth – correctly in Lecythidaceae] [T1].

There are no known specimens from this location.

July 8–20

Nonda Creek to Walsh River [Camps 9–13]: … following the course of the Nonda Creek,[39] so named from having met with this fruit for some time: and often mentioned by Leichhardt; also met with 'fan palm' [*Livistona muelleri* F.M.Bailey] [near Nolan Creek] and yellow '*grevillea*', in flower. After six miles of easy travelling over a light sandy soil, on sandstone formation, timbered with stringy-bark, bloodwood, gum, and nonda tree [*Parinari nonda* F.Muell. ex Benth.] [H2] … a great variety of shrubs and trees occurred which we had not seen before. One a kind of plum 20 ft high was loaded with a yellow fruit the size and shape of the yellow English plum. The fruit was seemingly eatable, but had that acrid taste so common to the Australian fruits. As this tree answered the description of the *Nonda parinarium* [*Parinari nonda*] so highly spoken of by Jardine, we looked upon it with great interest. The creek has been named in consequence Nonda Creek. I procured some leguminous shrubs with most ornamental foliage, also a deciduous tree with large leaves. The yellow *Grevillea* was here in full bloom, the first time we have had it so [T1] … on a sandy rise near an anabranch of the con-joined creeks [Nonda Creek and Walsh River]. Apple gum and pear trees [*Xylomelum scottianum* (F.Muell.) F.Muell.] [T1] … I have named this stream the Walsh[40] [H2] … so named after the Minister of Works, to whose patronage and countenance the Expedition owes its existence [H3] … light soil on the level ground on the top of the banks [of the Walsh River], which was also lightly timbered, but this only proceeded for a short distance, after which it became more scrubby and thick as it receded from the edges of the banks [H2] … first three miles being over poor stringy-bark country [H2] … Mimosa, flooded gum, bloodwood with of course the endless melaleuca consisted the bulk of the timbers [T1] … came to the creek of the 13th instant, which I have named Elizabeth Creek,[41] after my youngest child [H2] … went two miles north of west; came to a large creek which I called Louisa Creek after my older daughter[42] [H4] … the formation was limestone with deep rich soil, lightly timbered with mimosa and bauhinia [*Lysiphyllum hookeri* (F.Muell.) Pedley] and carrying many of the grasses of the Barcoo [H2, H3] ... from a mile near Louisa Creek, which I take to be a portion of Kennedy's Pebbly Range. I saw the Walsh bearing away to the westward [H2] ... sandy country, timbered with stringy bark and bloodwood with very little grass which was of a wiry, poor description [H4].

***Species collected*:** *Albizia canescens* Benth. (Mimosaceae) (*Tate 19*, *s.dat.*, BRI [AQ0230828]); *Basilicum polystachyon* (L.) Moench (Lamiaceae) (*Tate 41*, 16 Jul 1872, K 000674645); *Cochlospermum gillivraei* Benth. (Cochlospermaceae) (*Tate 31*, 13 Jul 1872, 'R. Palmer Walsh', K 000675858); *Cullen spicigerum* (Domin) A.E.Holland (as *Psoralea spicigera* Domin) (Lamiaceae) (*Tate 40*, 16 Jul 1872, K 000217498#); *Diospyros humilis* (R.Br.) F.Muell. (Ebenaceae) (*Tate 35*, *s.dat.*, BRI [AQ695385]); *Livistona* sp., (Arecaceae) (*Tate s.n.*, *s.dat.*, BRI [AQ0520869]); *Lygodium japonicum* (Thunb). Sw. (Lygodiaceae) (*Taylor s.n.*, *s.dat.*, 'York Peninsula Q.L.', MEL 2145231); *Parinari nonda* (Chrysobalanaceae) (*Taylor s.n.*, *s.dat.*, 'Yorks Penins', MEL 2226009).

July 21–31

Mitchell River [Camps 14–16]: … I had fixed my temporary camp on the Mitchell[43] [H2] … The country between the junction of the Mitchell and the Walsh and the Lynd is composed of conglomerate and sand coming onto the river, carrying stringy-bark and other timber common to this formation [H2] … The country was very lightly timbered with the mimosa, and belts of bloodwood and stunted gums [H2] … came upon a different formation of country, consisting of low sandstone ridges and conglomerate with stringy-bark on the latter [H2] … the timber was mimosa, bloodwood and box but very little of the latter [H4] … the broadleaf ti-tree and stringybark appeared again on the sandy ridges. The remaining 15 miles of the journey was intersected with belts of very good country which appeared to be swampy covered with blue bush and swamp grasses [H4] … the country was good, covered with thick rich grasses and timbered with mimosa, bloodwood and box [H4] … we passed and examined a range which Mr. Taylor said was of carboniferous formation, and to which I gave the name, "Taylor's Carboniferous Range"[44] [H2] … the timber today was iron bark, bloodwood and ti-tree [H4] … a remarkable range on the south I named Warner's Range [H3] …these were the peaks seen on the 7th inst., and then named "Warner's Peaks' [The Pinnacles] [H2] … Dr. Tate unwell from a slight attack of fever; one of the horses also ill, which was attributed to poison plant [H2] … at the distance of about twenty miles south-east, a very conspicuous mountain came into view which I have named Mount Lilley[45] [Mt Mulligan] [H2].

***Species collected*:** *Cymbidium canaliculatum* R.Br. (Orchidaceae) (*Taylor s.n.*, *s.dat.*, 'York Peninsula Q.L.', MEL 2150912); *Dendrolobium umbellatum* (L.) Benth. (Fabaceae) (*Tate 51*, 28 Jul 1872, 'north of Mitchell', K 000279004); *Lagerstroemia archeriana* F.M.Bailey (Lythraceae) (*Tate 47*, 21 Jul 1872, 'from upper part of Mitchell', K 000729689#); *Tephrosia astragaloides* R.Br. ex Benth. (Fabaceae) (*Tate 44*, 21 Jul 1872, K 000217062).

August 1–20

Garnet Creek to Palmer River [Camps 17–20]: … a remarkable mountain, which I have named Mount Mulgrave[46]; it forms the most conspicuous feature in this part of the country [H1, H3] … it [Mt Mulgrave] forms the termination of a range running north and south, bearing the same name [H2] … the timber we passed through was ironbark, bloodwood and box [H4] … a large running creek, which I have named Garnet Creek[47], owing to the large quantity of these valueless gems being found in the sand [H1] … the country, after the mica schist formation, was very poor and sandy, timbered with stringy-bark and broad-leaf tea-tree, both useless for any purpose [H2] … intending to-morrow to visit a remarkable mountain in sight of the camp, bearing N.E., and which I have named Mount Daintree[48]. This camp was fixed in lat. 15° 51' 59" [H2] … from its summit [Mt Daintree] could see another large water-course to the north [H2] … the hill was timbered with stunted broad leaf ti-tree and silver leaf iron bark [*Eucalyptus melanophloia* F.Muell.] [H5] … the country got more sandy and the timber altered to ti-tree, stringy bark and bloodwood [H4] … arrived at the above river, which I have named the Palmer, after the Chief Secretary of Queensland[49] [H2] … which I believe to be Kennedy's Ninety-Yards-Wide Creek [H1, H3] … the country on either side, which is timbered with ironbark, and other trees generally found on a light sandy soil [H2] … Taylor and I went on to Mt Jessie[50], distance 3 miles [H5] … gold was found in a gully names named Warner's Gully [H1].

***Species collected*:** *Abutilon hannii* Baker f. (Malvaceae) (*Tate 76*, *s.dat.*, K 000659610#); *Acacia victoriae* Benth. (as *A. hanniana* Domin) (Mimosaceae) (*Tate 59*, *s.dat.*, 'R. Palmer', K 000791808#); *Ampelopteris prolifera* (Retz.) Copel. (Thelypteridaceae) (*Taylor s.n.*, *s.dat.*, MEL 1502557); *Blumea benthamiana* Domin (Asteraceae) (*Tate 69*, *s.dat.*, K 000978543); *Dodonaea lanceolata* F.Muell. (Sapindaceae) (*Tate s.n.*, *s.dat.*, BRI [AQ0033458]); *D. malvacea* (Domin) M.G.Harr. (Sapindaceae) (*Tate 60*, 10 Aug 1872, 'R. Palmer', K 000701401#); *Drosera serpens* Planch. (Droseraceae) (*Tate 80*, *s.dat.*, BRI [AQ03228748]); *Hypoestes floribunda* var. *yorkensis* R.M.Barker (Acanthaceae) (*Tate 52*, 4 Aug 1872, 'north of Mitchell', K 000884493); *Indigofera pratensis* F.Muell. (Fabaceae) (*Tate 66*, 12 Aug 1872, 'R. Palmer', K 000217340); *Selaginella* sp. (Selaginellaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', *s.dat.*, MEL 2145340).

August 21–September 1

Palmer River to Coleman River [Camps 21–29]: … [on leaving the Palmer River] we then got into a forest country of some miles in extent, with the best timber I have seen in North Queensland, consisting of stringy-bark, bloodwood, and many other forest trees. The country was rising the whole distance, and consisted of sand on the surface – the grass was very dry [H2] … we struck a creek [Annie Creek?], when the country altered its appearance and timber, tea-tree appearing now [H2] … we now came upon a very different class of country, the timber changes from ironbark to stringybark [H6] … over a level tableland of sandy soil possessing the finest stringy bark and bloodwood trees. The Nonda [*Parinari nonda*] was here in abundance. The fruit is rather palatable when ripe and slightly nutritious [T1] … great quantities of nondas seen to-day, when quite ripe, their fruit is not to be despised [H2] … travelling was very good over undulating low ridges, timbered with bloodwood, ironbark with thick belts of broad leaf ti-tree [H4] … vegetation and soil which in many cases was swampy underwent a great change as we proceeded. A great quantity of small plants we had not met with before were procured here [T1] … I believe I was now on the Coast Range [Hann called it Main Range in H1] which is here low. The timber was of the finest description, consisting of stringy-bark, bloodwood, and large nonda trees [*Parinari nonda*] [H2] … the Doctor collected many supposed new varieties of plants on the top of the range [H2] … passed over a great deal of burnt country, all showing signs of being impassable during the rainy season, which is made evident by the ever present tea-tree [H2] … I was busy weighing and sorting my packs and the Doctor was arranging and examining his plants [H4] … proceeded with Mr. Taylor to a high table-land, about three miles to the eastward of the camp, which I have named Jessie's Tableland[51] [H1, H2] … over poor sandy country, timbered with the broad leaf tea-tree and banksia [*Banksia dentata* L.f.], after which we came upon a large creek running south-west, and near its junction coming from the north, which I have named the Coleman[52] [H2] … camped on a creek which I think will be the Kendall [of Jardine] [King River[53]] [H1, H3] … the Doctor found several new plants in the creek [H4] … The hill ascended by Mr. Taylor I have named Mount Newberry[54], after a friend of his in Melbourne [H2] … the Doctor got several new plants, small annuals which are to be found in abundance [H6] … we then crossed sandy ground, heavily timbered with stringy-bark and bloodwood, with poor grass, and after travelling ten miles arrived at a springy flat with abundance of water; it had banksias [*Banksia dentata*] and mimosas, and numerous small wild flowers growing all over it, all of which were collected by Dr. Tate [H2] … have procured a large collection of plants. Lat 14° 13' [T1].

Species collected: *Adenanthera pavonina* L. (Fabaceae) (*Taylor s.n.*, *s.dat.*, 'For Herbar Yorks Penins', MEL 0594740); *Cheilanthes pumilio* (R.Br.) F.Muell. (Pteridaceae) (*Taylor s.n.*, *s.dat.*, 'York Peninsula Q.L.', MEL 2164868); *Gomphrena flaccida* R.Br. (Amaranthaceae) (*Tate 95, 96*, 22 Aug 1872, 'Ck north of Palmer', K 000357324); *Owenia vernicosa* F.Muell. (as *Owenia capitis-yorkii* Domin) (Meliaceae) (*Tate 115*, *s.dat.*, K 000657892#); *Phyllanthus carpentariae* Müll. Arg. (Phyllanthaceae) (*Tate 106*, 24 Aug 1872, K 001056795); *Platyzoma microphyllum* R.Br. (Pteridaceae), (*Taylor s.n.*, *s.dat.*, 'Yorke Peninsula, W. side', MEL 2143039); *P. microphyllum* (Pteridaceae) (*Taylor s.n.*, *s.dat.*, 'York Peninsula Q.L.', MEL 2143046); *Psychotria loniceroides* var. *angustifolia* Benth. (Rubiaceae) (*Tate 129*, 31 Aug 1872, 'from watershed flowing into P. Charlottes Bay', K 000777507); *Spermacoce baileyana* Domin (Rubiaceae) (*Tate 105*, 24 Aug 1872, K 000265492#); *Stylidium adenophorum* Lowrie & Kenneally (Stylidaceae) (*Tate 112*, 24 Aug 1872, K 000060179); *S. alsinoides* R.Br. (Stylidaceae) (*Tate 90*, 22 Aug 1872, 'Ck north pf Palmer', K 000355236); *S. leptorrhizum* F.Muell. (Stylidaceae) (*Tate 82*, 22 Aug 1872, 'Ck north of Palmer', K 000355327); *S. schizanthum* F.Muell. (Stylidaceae) (*Tate 86*, 22 Aug 1872, 'Ck north of Palmer', K 000355241); *S. schizanthum* (Stylidaceae) (*Tate 88*, 22 Aug 1872, 'Ck north of Palmer', K 000355240); *Terminalia platyptera* F.Muell. (Combretaceae) (*Taylor s.n.*, *s.dat.*, 'York Peninsula', MEL 2149481).

September 2–11

Stewart River to Kennedy River [Camps 30–37]: … at the head of the river, which I have named the Stewart,[55] and which is Kennedy's River, 100 yards wide, many varieties of plants were seen – not met with before – and offered to an enthusiastic botanist a wide field for research [H1, H3] … it is timbered with ironbark on the ridges towards the Main Range, and with tea-tree lower down, which is again scrubby but open on to the coast [H1, H3] … after camping we all went botanising and found some beautiful plants quite new to me. [near Stewart River] One large magnificent creeper like the passion plant, the leaves were over 12 inches with a beautiful green [H4] … we followed the river [Stewart River] on which we were camped, and here met with many varieties of plants and trees to which we were strangers. Dr. Tate says he collected over twenty varieties, many of which were strange in appearance, while others were exceedingly pretty [H2] … on my way to the camp I got several fine flowers quite new to me [H6] … first part of the journey was over sandy country heavily timbered with stringy-bark and bloodwood [H2] … we camped on a reedy lagoon running into the river, which I have named the Stewart, after one of the members of my party [H2] … I got some plants for the Doctor. I spoke rather sharply to him today. In getting a fine specimen of a new plant I saw a few green ants on it. He at once threw it away on that account [H5] … the river [Stewart R] which is lined at its mouth with thick mangroves scrub [H5] … returned to camp with several new plants – the collection of which is now getting large [H2] …we turn south and endeavour to reach Cardwell by the coast [T1] … started on a south-east course for the Kennedy; the first five miles was over sandy tea-tree country, then two miles of a light loamy soil with long grass, which was terminated by a belt of vine scrub of no great width, when we emerged on a flat with the most beautiful varieties of trees yet seen, the foliage of which was so dense that no sun could penetrate beneath [H2] … poor old Ball knocked up and I left him at a creek, 7 miles from camp, which I have called Balclutha after the old horse[56] [H6]… undergrowth equally rich in appearance, and the two combined made it a beautifully cool and fresh-looking spot. There were also many miles of open forest land, with splendid timber of the stringybark species, magnificently adapted for telegraph poles [H1, H3] … after this, crossed onto a sandy ridge with stringy-bark of great height and straight [H2] … passed over barren flats destitute of grass and timber and with belts of tea trees [T1] … ridges with stringy bark [T1] … we again entered the stringy-bark forest [H2] … four miles more came upon some open country with broad leaf tea-tree, subject to floods [H2] … passed over large open plains with belts of pandanus [*Pandanus cookii* Martelli] and box [T1] …we were in a low moist flat, with a forest of tea-trees [H2] … passing some fair grazing country with belts of *Xanthorrhoea* [*Xanthorrhoea johnsonii* A.T.Lee] etc. [T1] … so we were on the Kennedy [H2] … close to our camp were clumps of fan palms [*Corypha utan* Lam.] of immense size and beauty – nothing had been seen like them before; the banks of the river were free from thick scrub [H2].

***Species collected*:** *Adiantum aethiopicum* L. (Pteridaceae) (*Tate 143*, *s.dat*., BRI [AQ0741990]); *Dendrobium bigibbum* Lindl. (Orchidaceae) (*Tate 151*, *s.dat*., K 000881551); *D. canaliculatum* R.Br. (Orchidaceae) (*Tate 161*, *s.dat*., K 001085443); *Indigofera pratensis* (Fabaceae) (*Tate 160*, *s.dat*., K 000217341); *Ixora timorensis* Decne. (Rubiaceae) (*Tate 172*, *s.dat*., K 000763338); *Mallotus nesophilus* Müll.Arg (Euphorbiaceae) (*Tate 169*, *s.dat*., K 0001067355); *Phyllanthus novae-hollandiae* Müll.Arg (Phyllanthaceae) (*Tate 138*, 2 September 1872, 'Eastern watershed 30 miles from Coast', K 001056821); *P. novae-hollandiae* (Phyllanthaceae) (*Tate 139*, 2 September 1872, 'Eastern watershed 30 miles from Coast', K 001056820); *Tephrosia simplicifolia* F.Muell. ex Benth. (Fabaceae) (*Tate 158*, *s.dat*., K 000216983).

September 12–16

Normanby River [Camps 38–41]: … I changed my course to the south-east, and passed over seven miles of a burnt and wretched country to a long lagoon of permanent water [H2] … came on the banks of a fine river [Normanby R], with steep banks clear of scrub [H2] … as this is a large and remarkable river, and one discovered by this expedition, I have named it the Normanby,[57] after Lord Normanby, the present Governor of Queensland [H2] … entered a fine green plain the largest we found during this trip [T1] … short distance back from the river we found the ridges to be of sandstone timbered with stringy-bark, but all of a wretched description [H2] … going in an easterly direction, which I found coming round to the north-east through a thick forest of stringy-bark and tea-tree [H2] … the Doctor gathered 15 fresh plants coming through the scrub today [H5] … entered a scrub of stringy-bark, tea-tree, and other small timber growing on sandy soil [H2] … over a dry sandy desert throughout without a vestige of grass and producing nothing but tea tree [T1] … a long picturesque plain was crossed covered with seedling gums, the deposits of floods [H1, H3] … all the best country is of a sandy nature timbered with stringy bark with lots of grass trees [*Xanthorrhoea johnsonii*] [H5] … came upon open box forest [T1] ... the river here had steep banks on either side with a strong stream, and was thickly timbered [H2].

Species collected **(all *s.dat.*):** *Alternanthera nodiflora* R.Br. (Amaranthaceae) (*Tate 202*, K 000357351); *Alyxia spicata* R.Br. (Apocynaceae) (*Tate 212*, K 000894161); *Asteromyrtus symphyocarpa* (F.Muell.) Craven (Myrtaceae) (*Taylor s.n.*, MEL 1587816); *Dodonaea malvacea* (Sapindaceae) (*Tate 207*, K 000701402#); *Hovea longifolia* var. *lanceolata* (Sims) Benth. (Fabaceae) (*Tate 213*, K 000278775); *Indigofera viscosa* Lam. (Fabaceae) (*Tate 229*, K 000217309); *Luffa aegyptiaca* Mill. (Cucurbitaceae) (*Taylor s.n.*, MEL 0593089); *Millettia pinnata* (L.) Panigrahi (Fabaceae) (*Tate 186*, K 000618772); *Persoonia falcata* R.Br. (Proteaceae) (*Tate 221*, K 000736891); *Barringtonia acutangula* (L.) Gaertn. [as *Stravidium denticulatum* Miers] (Lecythidaceae) (*Tate 195*, BM 001015973#, K 000761580#); *Strychnos lucida* R.Br. (Loganiaceae) (*Taylor s.n.*, 'Yorks Penins for Herbarium', MEL 2191383); *Stylidium adenophorum* (Stylidaceae) (*Tate 193*, K 000060180); *Tephrosia simplicifolia* (Fabaceae) (*Tate 192*, K 000216983); *Urena armitiana* F.Muell. (Malvaceae) (*Tate 203*, K 000659714); *Vigna lanceolata* var. *filiformis* Benth. (Fabaceae) (*Tate 215*, K 000279299).

September 17–27

Normanby Range, Cunningham Range, Oaky Creek and Annan River (misidentified as the Endeavour River by Hann) [Camps 42–50]: … descended a steep hill into the valley of the Normanby [H2] … for the first time, we here met with the Moreton Bay chestnut [*Castanospermum australe* A.Cunn. ex Mudie] and banana trees [*Musa banksii* F.Muell.] [H2] … we had to wind ourway down among sandstones [H6] … I have called this Gripe Camp on account of most of the party being griped all night from the effects of their eating the Cluster Fig [*Ficus racemosa* L.] Morton Bay Chestnut [*Castanospermum australe*] [H5] … this range was the divide between the waters of the Normanby and the Endeavour [H2] … camped on a poplar gum [*Eucalyptus platyphylla* F.Muell.] flat at foot of a very high conspicuous range [H5] … through a poor country, with stringy-bark and bloodwood, and in the creek we saw the old familiar oaks [*Casuarina cunninghamiana* Miq.] – the first since leaving Fossilbrook, owing to which circumstance I have named it "Oaky Creek"[58] [H2] … the range I have called "Cunningham's Range"[59] [H2] ... poplar gums [*Eucalyptus platyphylla*] seen in this flat [H2] … followed the course of Oaky Creek in an easterly direction [H2] … the first two and a-half miles was over tea-tree country [H2] … found ourselves on the banks of a large river [Annan R] just above its junction with Oaky Creek, the river running north and south and was salt. This river was, of course, no other than the Endeavour [correctly the Annan River][60][H2] … followed its windings for ten miles, when we came to saltwater tea-tree and mangroves [H2] … we crossed a low greenstone range, when the country changed to a miserably poor soil with tea-tree and poplar gum [*Eucalyptus platyphylla*] [H2] … I noticed the nonda trees [*Parinari nonda*] here [H6] … Mt. Thomas has been in sight since yesterday[61] [T1] … on recently burnt ground some poisonous herb makes its appearance in these parts, which is eaten by the horses, and from which many of them die [H1] … we crossed the river [Annan R], owing to a spur from Mount Cook[62] coming right on to its banks [H2] …went on the beach [Walker Bay] and tried to get to the mouth of the river [Annan River] but could not on account of a mangrove creek [H5] … saw the stinging nettle [*Dendrocnide moroides* (Wedd.) Chew] for the first time [H2] …. occasional vine scrub to cut through [T1] … the mountains are all covered with a dense scrub [H6].

Species collected **(nearly all *s.dat.*):** *Abrus precatorius* L. (Fabaceae) (*Taylor s.n.*, 'Herbarium Yorke's Peninsula', MEL 0726485); *Acrostichum speciosum* Willd. (Pteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2152110); *Amorphospermum antilogum* F.Muell. (Sapotaceae) (*Taylor s.n.*, 'Herbar, Yorks Peninsula', MEL 2186951); *A. antilogum* (Sapotaceae) (*Taylor s.n.*, 'Herbar Probably from Norm Taylors Cape York collect', MEL 2192383);

Amphineuron terminans (Hook.) Holttum (Thelypteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2163496); *Arthropteris palisotii* (Desv.) Alston (Davalliaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0239704); *Calytrix leptophylla* Benth. (Myrtaceae) (*Tate s.n.*, BRI [AQ0695483]); *Castanospermum australe* (Fabaceae) (*Tate 232*, 'Hann Exp', BRI [AQ00017915]); *Ceratopteris* sp., (Pteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2146922); *Cochlospermum gillivraei* Benth. (Bixaceae) (*Taylor s.n.*, 'Herbarium Yorke Peninsula', MEL 0081470); *Coronidium rupicola* (DC.) Paul G.Wilson (Asteraceae) (*Tate 295*, K 000899130); *Crepidomanes bipunctatum* (Poir.) Copel. (Hymenophyllaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0019306); *Dalbergia densa* Benth. (Fabaceae) (*Tate 280*, Sep 1872, 'Endeavour River Coll Hann Expedition', BRI [AQ0019377]); *Dendrobium canaliculatum* (Orchidaceae) (*Tate 278*, K 001085445); *Drynaria quercifolia* (L.) J.Sm. (Polypodiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2158813); *Eugenia reinwardtiana* (Blume) DC. (Myrtaceae) (*Tate 275, 276*, K 000821556); *Glycine microphylla* (Benth.) Tindale (Fabaceae) (*Tate 282*, BRI [AQ0695427], K 000665485); *G. tabacina* (Labill.) Benth. (Fabaceae) (*Tate 267*, K000119063); *Goodenia paniculata* Sm. (Goodeniaceae) (*Tate 277*, K 000215970); *Lindsaea brachypoda* (Lindsaeaceae) (*Tate 292*, K 000665485); *L. obtusa* J.Sm. (Lindsaeaceae) (*Taylor s.n.*, 'Endeavour River Bloomfield River', MEL 2164082); *L.* sp., (Lindsaeaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164051); *L.* sp. (Lindsaeaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164069); *Lygodium flexuosum* (L.) Sw. (Lygodiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164700); *L. japonicum* (Lygodiaceae) (*Taylor s.n.*, 'York's Peninsula', MEL 2145232); *Melastoma malabathricum* L. (Melastomataceae) (*Tate 273*, BRI [AQ0717267]); *Millettia pinnata* (Fabaceae) (*Tate 274*, K 000618771); *Pothos brownii* Domin), (Araceae) (*Tate s.n.*, BRI [AQ0431166]); *Ptisana oreades* (Domin) Murdock (Marattiaceae) (*Taylor s.n.*, 'Yorke's Peninsula', MEL 2162878); *Pyrrosia longifolia* (Burm.f.) C.V.Morton (Polypodiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2147112); *Schizaea dichotoma* (L.) Sm. (Schizaeaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0571819); *Selaginella ciliaris* (Retz.) Spring (Selaginellaceae) (*Taylor s.n.*, 'York Peninsula Queensland', MEL 2143426); *S. longipinna* Warb. (Selaginellaceae) (*Tate s.n.*, BRI [AQ0418967]); *Solanum magnifolium* F.Muell. (Solanaceae) (*Tate s.n.*, BRI [AQ0332186]); *Stylidium alsinoides* (Stylidiaceae) (*Tate 271*, K 000355237); *Tectaria confluens* (Hook. & Baker) Pic.Serm. (Dryopteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2155618); *Velleia spathulata* R.Br. (Goodeniaceae) (*Tate 263, 264*, K 000215436).

September 28–October 15

Annan River to Bloomfield River [Camps 51–64]: … I sent out a prospecting party to follow a native path from this camp into the scrub [H1] … open space surrounded with dense scrub [T1] … surrounded on all sides with dense scrub [T1] … to the south huge ranges rose up tier upon tier, the highest and most conspicuous being Peter Botte[63] [T1] … Jerry came across a strange animal, with the likeness of a kangaroo and the habits of a 'possum [*Dendrolagus lumholtzi* Collett, 1884]. In New Guinea there is a veritable tree kangaroo but I was not aware that it was to be found in Australia. The native name he says is 'brangeri' [bongarry][64] [T1] … the thorns and lawya [*Calamus* spp.] scrubs irritate both men and beasts; at times it was difficult to get away from the close embrace of these latter; their long arms were drawn across the face, the hands, the clothes - they would not suffer to be shaken off; they required gentle and civil treatment, otherwise they kept their hold, and very much reminded me of other lawyers not found in scrubs [H1, H3] … stopped by a broad stream – the Bloomfield of the chart[65] [H2] … the Bloomfield finds its outlet in Weary Bay[66] – an uninteresting spot, with a sandy beach bordered by light scrub [H2] … made out our position to be due west of Cape Tribulation[67], then only a few miles distant from us [H2] … hill which has been named Consultation Peak[68] [T1] … we had dense scrub to contend with, not the ordinary scrub but a mass of foliage interlaced with loir [*Calamus* sp.], supple jack [*Flagellaria indica* L.] and all kinds of prickly abominations [T1] …we drew near the summit of the ridge, which was crowned with scrub [H2]… at our feet lay miles of thick and impenetrable scrub, covering ridges and gullies alike [H2] … Cape Tribulation and the country for miles around its base was a sea of scrub, which extended as far as our vision in a southerly direction [H2] … at the point where I left the Bloomfield, it was seen taking its course into the Main Range; the Endeavour [Annan River] was left taking its course into the scrubby, mountains of the coast, a few miles from the sea, near Mount Thomas [H1, H3] …Schnapper Island [Snapper Island][69] was due east from us and the southern portion of the bay was south 40 east [H6].

Species collected **(all *s.dat.*):** *Abrodictyum brassii* (Croxall) Ebihara & K.Iwats. (Hymenophyllaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0019380); *A. obscurum* (Blume) Ebihara & K.Iwats. (Hymenophyllaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0019455); *Adiantum aethiopicum* L. (Pteridaceae) (*Taylor s.n.*, MEL 1558622); *A. aethiopicum* (Pteridaceae) (*Taylor s.n.*, MEL 1558623); *Aleurites moluccanus* (L.) Willd. (Euphorbiaceae) (*Taylor s.n.*, 'Herbarium N.A.', MEL 0232479); *Asplenium nidus* L. (Aspleniaceae) (*Taylor s.n.*, MEL 0114909); *A. paleaceum* R.Br. (Aspleniaceae) (*Taylor s.n.*, MEL 0114956); *A. simplicifrons* F.Muell. (Aspleniaceae) (*Taylor s.n.*, MEL 0114977); *Blechnum cartilagineum* Sw. (Blechnaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 0053967); *Bolbitis taylori* (F.M.Bailey) Ching (Dryopteridiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2168714); *Cadetia taylori* (F.Muell.) Schltr. (as *Bolbophylum* [= *Bulbophyllum*] *taylori* F.Muell.) (Orchidaceae) (*Taylor s.n.*, MEL 1540845#); *Cheilanthes tenuifolia* (Burm.f.) Sw. (Pteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2154573); *Cyathea cooperi* (Hook. ex F.Muell.) Domin (Cyatheaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2148762); *C. rebeccae* (F.Muell.) Domin (Cyatheaceae) (*Tate 348*, K 000061762); *Humata Cyclosorus interruptus* (Willd.) H.Ito (Thelypteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2163720); *Davallia* sp. (Davalliaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164592); *Doodia media* R.Br. (Blechnaceae) (*Taylor s.n.*, MEL 1010090); *Elaeocarpus* sp. (Elaeocarpaceae) (*Taylor s.n.*, 'Herbarium Yorks Peninsula', MEL 2227702); *Eupomatia laurina* R.Br. (Eupomatiaceae) (*Tate 324*, K 000574914); *Humata repens* (L.f.) Small ex Diels (Davalliaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2170750); *Lastreopsis poecilophlebia* (Hook.) Labiak, Sundue & R.C.Moran (Dryopteridaceae) (*Taylor s.n.*, MEL 1502583); *Lindsaea brachypoda* (Lindsaeaceae) (*Taylor s.n.*, 'York Peninsula, N Australia, coll Norman Taylor ex herb. Mueller 9/77', K 000665483); *L.* sp. (Lindsaeaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164059); *L. obtusa* J.Sm. (Lindsaeaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2164081); *Linospadix minor* (W.Hill) Burret (Arecaceae) (*Tate 302*, K 000209488); *Lygodium reticulatum* Schkuhr (Lygodiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2145162); *Myristica insipida* R.Br. (Myristicaceae) (*Taylor 5*, 'Yorke's Peninsula', MEL 2204828); *Paphia meiniana* (F.Muell.) Schltr. (as *Agapetes queenslandica* Domin) (Ericaceae) (*Tate 315*, K 000780935#); *Pronephrium asperum* (C.Presl) Holttum (Thelypteridaceae) (*Taylor s.n.*, MEL 1502759); Pteridophyte indet. (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2129589); *Pteris ensiformis* Burm.f. (Pteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2152565); *P. pacifica* Hieron. (Pteridaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2152586); *P. tremula* R.Br. (Pteridaceae) (*Taylor s.n.*, 'York's Peninsula', MEL 2153137); *Siphonodon australis* Benth. (Celastraceae) (*Taylor s.n.*, 'Yorke Peninsula', MEL 2271952); *Sticherus flabellatus* (R.Br.) H.St.John (Gleicheniaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2144553); *Tectaria confluens* (Hook. & Baker) Pic.Serm. (Tectariaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2155019).

October 16–29

Bloomfield River to Palmer River via Laura River (named as the Hearn River by Hann) [Camps 65–75]: … we got back to Cancellation Peak [also Consultation Peak] [H5] … on a general course of west 25° north, I reached the first of the numerous branches of the Normanby [H1, H3] … to the west of our camp is a high and conspicuous as well as a strong and scrubby range, which I have named Andrew's Range at the request of the Doctor, who had a friend of that name in the ill-fated "Maria," bound to New Guinea, and who was drowned after the wreck of that vessel[70] H2] … the green and fresh-looking scrubs have also disappeared, to be replaced by dry and hard looking ridges. This was our first new camp towards the west [H2] … descended into another branch of the Normanby [Laura River, named as the Hearn River by Hann][71] [H2] … I believe this to be the headwaters of the Kennedy [H2] … went on ahead with Mr. Taylor to take bearings from a remarkable saddle hill, which I have named Mount Aplin,[72] after a friend in Townsville [H2] … I have no doubt now as this stream being the Kennedy [H2] … the Normanby. I now believe that we have been the whole time on the watersheds of the latter river [Normanby R] [H2] … we have not yet seen the Kennedy [H2]… poorest description, being nothing but sand, and timbered with stringy-bark, bloodwood, and numerous other trees found on sandy soil [H2] … this sandstone range continues to Jane's Tableland,[73] at the south end of Princess Charlotte's Bay[74] [H3] … Taylor and I went up the east branch of the creek [tributary of Palmer River]. He found ferns in the limestone. He got three varieties of ferns and one glyphospermum. I wish he could find more as I believe these are the first which have been found in northern Queensland [H4].

***Species collected* (all *s.dat.*):** *Angiopteris evecta* (G.Forst.) Hoffm. (Marattiaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2142979); *Cajanus marmoratus* (Benth.) F.Muell. (Fabaceae) (*Tate 379*, K 000279410); *Crotalaria trifoliastrum* Willd. (Fabaceae) (*Tate 368*, K 000217233); *Marsdenia microlepis* Benth. (Asclepidaceae) (*Tate 365*, K 000873033); *Polycarpaea spirostylis* F.Muell. (Caryopyllaceae) (*Taylor s.n.*, K 000723257); *Selaginella longipinna* Warb. (Selaginellaceae) (*Taylor s.n.*, 'York Peninsula Q.L.', MEL 2142965).

October 30–November 12

Palmer River to Junction Creek [Camps 76–88]: … went a south course with Mount Mulgrave as our signboard [H2] … we passed Taylor's Peak[75] on our right hand [H4] …this brought us to the divide between the Palmer and the Mitchell Rivers [H2] … a bold, high and remarkable range stretches across from the bank of the Palmer to that of the Mitchell – I have named it "Thompson Range" after the Minister for Lands[76] [H3] … bade farewell to Mount Mulgrave [H2] … here [south of Palmer River] we also procured a vegetable called "Jack's grass," which makes a tolerable edible when boiled: it makes its appearance after rain, and bears a small blue flower [possibly *Commelina ensifolia* R.Br.] [H2] ... struck Elizabeth Creek at the spot crossed by us on our outward track [H2] … on the 1st November, I reached the Walsh [H1, H3] … followed the windings of a tributary of the Tate [H2] … we struck the Tate where there was an abundance of water but no grass [H4] … the first hill I named Mount MacDevitt, after the member for Kennedy[77], and the other Mount St. George, after the Commissioner at the Etheridge[78] [H2] … on the 9th November I reached the Lynd, and on the evening of the same day I made my camp on Fossilbrook Creek [H1, H3] … on the road for Mount Surprise, which we reached by one o'clock [H1] ... on to Junction Creek to telegraph the arrival of the party [H2] … accompanying this letter is: Diary of Expedition, Map of Expedition, Botanical Specimens collected by Dr. Tate, Fossils and "pannings off" by myself [H1].

There are no known specimens from these locations.

Taxonomic results of the expedition and conclusion

A total of 149 specimens from the expedition have been located. Overall, the botanical results of the expedition were meagre considering the potential to encounter and collect new species in the habitats travelled through, such as the diverse and species-rich rainforest areas between the Annan and Bloomfield rivers. In the expedition reports and diaries, this habitat was described as 'dense scrub' and was mostly referenced in respect to the difficulties that it posed to travel, how it represented a 'barrier' and was to be dreaded and avoided, and from which they were ultimately forced to retreat to open forests (Sanderson 2004). Tate's engagement with the flora of these habitats was minimal, whereas Taylor made a collection of ferns that proved of considerable interest to botanists (Mueller 1874b; Bentham 1878; Bailey 1879, 1886).

Some notable species were reported in both Hann's and Tate's diaries mostly related to edible plants, such as the fruit of the Nonda (*Parinari nonda*) and the edible leaves of Jack's grass (possibly *Commelina ensifolia*). Tate (1872) wrote of the Nonda:

> a kind of plum 20 ft high was loaded with a yellow fruit the size and shape of the yellow English plum. The fruit was seemingly eatable, but had that acrid taste so common to the Australian fruits. As this tree answered the description of the *Nonda parinarium* so highly spoken of by Jardine, we looked upon it with great interest.

Table 2. Plant names commemorating William Hann, Thomas Tate or Norman Taylor, associated with Hann's Northern Expedition of 1872. Currently used names are in bold type. Names indicated * are based on collections not made on the expedition.

Abutilon hannii Baker f., *J. Bot.* 31: 268 (1893). 'Hab. Queensland. Cape York Peninsula Exp., W.Hann No. 76' [= *T. Tate 76*].
Acacia hanniana Domin, *Biblioth. Bot.* 22(89): 807 (1926). [= **Acacia victoriae** Benth.]. 'Nord-Queensland: Cape York, W.Hann, Cape York Peninsular Expedition No. 59' [= *T. Tate 59*].
***Bolbitis taylori** (F.M.Bailey) Ching, *Index Filicum* Edn. Suppl. 3: 50 (1934); *Acrostichum taylori* F.M.Bailey, *Report Acclimat. Soc. Queensland 1883*: 11 (1884). 'I have named this fern after Dr. Norman Taylor, thinking it probable that the small fertile specimens in that gentleman's York Peninsula specimens referred by Mr. Bentham in *Flora Australiensis,* vol. vii, p. 779, to Blume's *A. repandum*, were in all probability belonging to the present species'.
Cadetia taylori (F.Muell.) Schltr., *Repert. Spec. Nov. Regni Veg.* 1: 424 (1912); *Bulbophyllum taylori* F.Muell., *Fragm.* 8(65): 150 (1874). '*Norman Taylor, cui species dicata*'.
Pongamia pinnata var. *hannii* Domin, *Biblioth. Bot.* 22(89): 787 (1926) [= **Pongamia pinnata** var. **minor** (Benth.) Domin]. **Type:** 'Cape York Penin. Expedition. Comm. Queensland Government, Dec. 1873, W.Hann 274' [= *T. Tate 274*] (lecto: K 000618771, *fide* Cooper *et al.* 2019).
Premna tateana* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 4: 15 (1891) [= **Premna serratifolia L.]. 'After T. Tate, botanic collector of Hann's Expedition'. Later Bailey noted in his Presidential Address, July 1891: 'Thos. Tate, the botanic collector of Hann's Northern Expedition in 1872, collected a number of specimens which were forwarded to the Kew Herbarium, that Mr. Bentham might examine them for his work on the Flora then in progress. Finding no plant named after this collector, I have given a lately-received plant of that district his name, *Premna tateana*'.

In recognition of this plant, Hann named Nonda Creek, a tributary of Walsh River. Hann also reported on the vegetation in his diaries and noted that Jack's grass 'makes a tolerable edible when boiled: it makes its appearance after rain, and bears a small blue flower' (Hann 1873). The names of plant species commemorating the members of the expedition are presented in **Table 2**.

This paper has revealed the problem with attribution as to who collected specimens and was responsible for their future dispersal and study. On termination of the expedition, Hann commandeered both Tate's botanical collections and all the geological and palaeontological specimens mainly collected by Taylor, but failed to provide clear acknowledgement of the actual collector. This paper has demonstrated that Tate was the official collector of the botanical specimens and that future reference to them should reflect this fact.

The history and fate of botanical collections is only occasionally considered by taxonomists in their day-to-day work. Aspects of collection methods, numbering, the personalities involved, and subsequent difficulties are rarely recorded in taxonomic accounts. Many of these aspects admittedly have only limited bearing on taxonomic outcomes which are mostly concerned with taxon descriptions, typification, specimen locations and adherence to the rules of nomenclature. The botanical collections made during the Hann Northern Expedition are identifiable as discrete collections of a defined and well-documented route and provide some indication of the composition of the vegetation at that time. Although not attempted in this paper, comparison with existing vegetation is possible.

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[2] Queenslander, 13 Jul 1872, p. 11, 'The Etheridge'; Maryborough Chronicle, Wide Bay and Burnett Advertiser, 30 Jul 1872, p. 4, 'Miscellaneous'.

[3] Age, 19 Nov 1872, p. 3, 'The York Peninsula'; Telegraph, 30 May 1873, p. 3, 'Cape York Expedition'.

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[5] Pearn (2001) in his book *Doctor in the Garden* incorrectly stated that the cousins Thomas Tate and Ralph Tate were brothers.

[6] Otago Daily Times, 6 Dec 1865, 'Shipping'.

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[24] Rockhampton Bulletin, 12 Dec 1872, p. 2, 'Shipping intelligence'; Brisbane Courier, 16 Dec 1872, p. 2, 'Shipping'.

[25] Argus, 7 Jun 1873, p. 1, 'Geological map of Australia and Tasmania'; Brisbane Courier, 15 Nov 1873, p. 5, 'The course of the Mitchell River'.

[26] Sydney Morning Herald, 8 May 1874, p. 6, 'Baron Mueller'.

[27] Herald, 19 Feb 1873, p. 3, 'Fossils in Queensland'.

[28] Queenslander, 1 Mar 1873, p. 2, 'The York Peninsular Expedition'.

[29] Maryborough Chronicle, Wide Bay and Burnett Advertiser, 22 Mar 1873, p. 4, 'Incidents of Mr. Hann's expedition'.

[30] N. Taylor to W. Hann, 5 Feb 1873, James Cook University Special Collections.

[31] William Hann married Mary Burge Hearn in 1859; she was the eldest daughter of James Hearn, a wealthy land speculator and businessman in Victoria; Age, 17 Nov 1859, p. 3, 'Family notices'.

[32] Hacketts Creek was named by William Hann for Thomas Ridge Hackett (1830–1884), Gold Commissioner at Ravenswood, 1869–1873; Rockhampton Bulletin, 28 Jun 1870, p. 3, 'Official notifications'; Ferguson, J. & Brown, E. (2009). *The Gympie Goldfield 1867–2008*. Gympie Regional Council: Gympie.

[33] Lynd River was named by Ludwig Leichhardt to honour Lieutenant Robert Lynd, his friend and financial supporter (Leichhardt 1847).

[34] Kirchner Range was named by Ludwig Leichhardt for William Kirchner, a supporter of his Overland Expedition (Leichhardt 1847).

[35] Gregory's Bluff, a name given by William Hann, is not currently in use.

[36] Tate River was named by William Hann for Thomas Tate, botanist of the Expedition.

[37] Pint Pot Creek, a name given by William Hann, is not currently used in this area.

[38] Warners Peaks, Warners Range and Warners Gully were named by William Hann for Frederick Horatio Warner (1842–1906), surveyor of the expedition and discoverer of gold at Palmer River.

[39] Nonda Creek was named by William Hann because of the presence of the edible nonda tree, *Parinari nonda*.

[40] Walsh River was named by William Hann for William Henry Walsh (1823–1888), Queensland's Secretary for Public Works 1870–1873.

[41] Elizabeth Creek was named by William Hann for his youngest daughter Elizabeth Caroline (Lily) Hann (1868–1943), later Elizabeth Clarke.

[42] Louisa Creek was named by William Hann for his eldest daughter Louisa Clark Hann (1861–1895), later Louisa Keppel.

[43] Mitchell River was named by Ludwig Leichhardt for Sir Thomas Livingstone Mitchell (1792–1855), New South Wales Surveyor-General 1828–1855 (Leichhardt 1847).

[44] The name Taylor's Carboniferous Range is not in current use.

[45] Origin of name not recorded but possibly named by William Hann for Charles Lilley, Member of the Legislature Assembly, Attorney-General, and active law reformer: correctly Mt. Mulligan.

[46] Mt Mulgrave was named by William Hann after the Earl of Mulgrave, son of the Governor of Queensland, Marquess of Normanby.

[47] Garnet Creek was named by William Hann because of the large number of garnets found in the river sand.

[48] Mt Daintree was named by William Hann for Richard Daintree (1832–1878), Government Geologist for Northern Australia 1868–1870, Queensland's Agent-General in London 1872–1876, and friend and business partner.

[49] Palmer River was named by William Hann for Arthur Hunter Palmer (1819–1898), Premier of Queensland 1870–1874.

[50] The derivation of Mt Jessie [near Palmer River] was not recorded. It is a different location to Jessies Tableland [near Coleman River], see later entry.

[51] The derivation of Jessies Tableland [near Coleman River] was not recorded by William Hann.

[52] The derivation of Coleman River was not recorded by William Hann.

[53] King River was named by James Venture Mulligan (Jack 1921).

[54] Mt Newberry (current spelling) was named by William Hann for James Cosmo Newbery (1843–1895), chemist of the Geological Survey of Victoria.

[55] Stewart River was named by William Hann after William Robert Stewart, one of the expedition members.

[56] Balclutha Creek was named by William Hann in dedication to his horse 'Bal' that 'knocked up' at this location.

[57] Normanby River was named by William Hann after the Governor of Queensland, Marquess of Normanby, George Augustus Constantine Phipps (1819–1890).

[58] Oaky Creek was named by William Hann because of the presence of She-oaks, *Casuarina cunninghamiana*.

[59] The derivation of Cunningham Range was not given by William Hann, but possibly named for the family that his sister, Caroline Sharp Cunningham (*née* Hann) married into.

[60] Annan River was named by John Jardine after the Annan River in Scotland (Jardine 1867).

[61] Mt Thomas, if correctly identified by Tate, lies to the south of the mouth of Annan River. A more conspicuous mountain at 300 m taller is Mt. Amos, *c.* 4 km to the north-west. Origin of the name has not been determined.

[62] Mt Cook was named by Philip Parker King (King 1826).

[63] Mt Pieter Botte was named by Captain Owen Stanley for its resemblance to Mt Pieter Botte in Mauritius (Stanley 1852).

[64] The tree kangaroo, *Dendrolagus lumholtzi*, was only seen by Jerry and no other expedition members. There was evidence of scratching on tree trunks whilst bones, supposedly of the animal, were collected in a native camp. The first scientific collections were made by Carl Lumholtz in 1883.

[65] Bloomfield River was named by Phillip Parker King (King 1826).

[66] Weary Bay was named by James Cook (Beaglehole 1955).

[67] Cape Tribulation was named by James Cook (Beaglehole 1955).

[68] Consultation Peak was a name given by William Hann to the location where the Expedition party agreed to retrace their steps northward and no longer proceed south through dense rainforest. It was also referred to as Cancellation Peak. Neither of these names has been taken up.

[69] Snapper Island was named by Charles Jeffreys (Gill 1978–1979).

[70] Andrews Range was named by William Hann for Charles T. Andrews, Second Officer of the brig *Maria*, a friend of Thomas Tate, and who drowned during the wreck of that ship on 26 Feb 1872. The *Maria* ran aground on Bramble Reef, about 35 km directly east of Hinchinbrook Island. Of the complement of about 75 passengers, there were only 40 survivors, including Tate; Queensland Times, 7 Mar 1872, p. 3, 'The fate of the New Guinea expedition'; Queenslander, 13 Apr 1872, p. 8, 'The New Guinea expedition (by one of the survivors [Thomas Tate]).'

[71] Hearn River [Laura River] was named by William Hann for his wife's family; Mary Burge Hann (*née* Hearn); Argus, 4 Nov 1859, p. 4, 'Family notices'.

[72] Mt Aplin was named by William Hann for William Aplin (1840–1891), friend, businessman, pastoralist and parliamentarian.

[73] Janes Tableland was named by Charles Jeffreys (Gill 1978–1979).

[74] Princess Charlotte Bay was named by Charles Jeffreys (Gill 1988).

[75] Mt Taylor was named by William Hann for Norman Taylor, geologist of the expedition.

[76] Thompsons Range was named by William Hann for John Malbon Thompson (1830–1908), Queensland's Secretary for Lands 1870–1873.

[77] Mt MacDevitt was named by William Hann for Edward O'Donnell MacDevitt (1843–1898), Member of the Queensland Legislative Assembly, and Member for Kennedy 1870–1873.

[78] Mt St George was named by William Hann for Howard St. George (1825–1898), Gold Commissioner for the Etheridge Goldfield 1870–1872: Telegraph, 11 May 1897, p. 2, 'Late Mr. Howard St. George'.

Austrobaileya 10(3): 539–540 (2019)

SHORT COMMUNICATION

Rediscovery of the previously Extinct *Marsdenia araujacea* F.Muell. (Apocynaceae)

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At the time of my taxonomic account of *Marsdenia* R.Br. in Australia and Papuasia, the species *M. araujacea* F.Muell. had not been recollected since 1893 (Forster 1995) and consequently has been listed as **Extinct** (*viz.* EPBC 1999) or **Extinct in the Wild** (NCWR 2006). This is no longer the case following a recent collection slightly to the north of the previously known distribution. The species is still apparently uncommon as the primary collector stated that only a single specimen was seen. However, this group of *Marsdenia* species (*M. glandulifera* C.T.White, *M. hemiptera* H.Rchb., *M. paludicola* P.I.Forst.), are patchily distributed in Australia, often in spring fed rainforest systems from northern New South Wales through eastern Queensland and across into the Northern Territory.

Taxonomy

Marsdenia araujacea F.Muell., *Fragm.* 6: 135 (1868). **Type:** Queensland. Cook District: Stone River, 24 October 1866, *J. Dallachy s.n.* (holo: MEL 113385, 113386); iso: BRI [AQ333092]).

Vincetoxicum pachylepis F.M.Bailey, *Bot. Bull.* 8: 78 (1893). **Type:** Queensland. Cook District: Kamerunga, Barron River, January 1893, *E. Cowley s.n.* (holo: BRI [AQ333088]).

The previous species description can be amended slightly, *viz.*

Fruit fusiform-ovoid, glabrous, 13.5–15 cm long, 5–8 cm wide (fully expanded), slightly warty near tip and with the tip slightly incurved. **Fig. 1.**

***Additional specimen examined*: Queensland.** Cook District: 26.1 km N of Hopevale on Binirr NP (CYPAL), Sep 2016, *Thompson SLT16602, McConnell, McClean, Nipper, D., Nipper, B. & Nipper, H.* (BRI).

***Distribution and habitat*:** *Marsdenia araujacea* is endemic to northeast Queensland where it has been recorded from Binirr National Park (CYPAL) south to the Stone River, west of Ingham. The recent collection is from a *Blepharocarya involucrigera* F.Muell. gallery forest; these are invariably associated with permanent water, albeit often by tapping underground springs or aquifers. *Blepharocarya* dominated communities are widespread; however, they are often linear in distribution following water courses or otherwise just around a water source.

***Conservation status*:** This species is now assigned **Endangered** conservation status under the NCA (1992).

Acknowledgements

Thanks to Simon Thompson from the Department of Aboriginal and Torres Strait Islanders Partnerships, and traditional owners and ranger staff for Binirr National Park (CYPAL). The collection was photographed by Lorna Ngugi.

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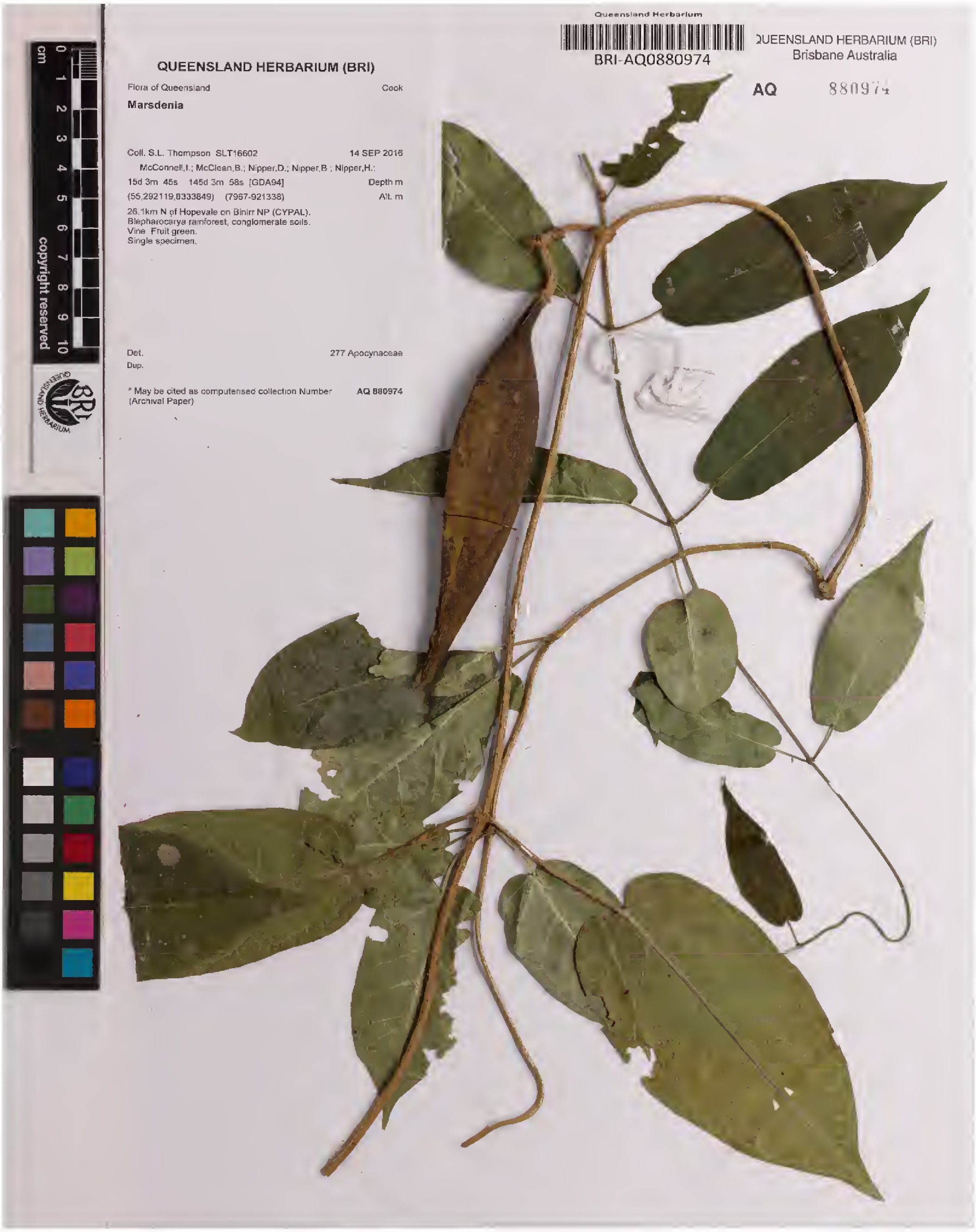
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Flora of Queensland Cook

Marsdenia

Coll. S.L. Thompson SLT16602 14 SEP 2016
McConnell,I.; McClean,B.; Nipper,D.; Nipper,B ; Nipper,H.;
15d 3m 45s 145d 3m 58s [GDA94] Depth m
(55,292119,8333849) (7967-921338) Alt. m
26.1km N of Hopevale on Binirr NP (CYPAL).
Blepharocarya rainforest, conglomerate soils.
Vine Fruit green.
Single specimen.

Det. 277 Apocynaceae
Dup.

* May be cited as computerised collection Number AQ 880974
(Archival Paper)

Fig. 1. ***Marsdenia araujacea*** (*Thompson SLT16602 et al.*, BRI).

Dendrocnide cordata (Warb. ex H.J.P.Winkl.) Chew (Urticaceae) is not present in Australia

A.R. Bean

Summary

Bean, A.R. (2019). *Dendrocnide cordata* (Warb. ex H.J.P.Winkl.) Chew (Urticaceae) is not present in Australia. ***Austrobaileya* 10(3): 541–544.** For the past 50 years, *Dendrocnide cordata* (Warb. ex H.J.P.Winkl.) Chew has been cited as being present in Queensland, Australia. Recent examination of specimens from Queensland and New Guinea reveals that all recorded Australian occurrences of *D. cordata* are referrable to either *D. cordifolia* (L.S.Sm.) Jackes & M.Hurley or *D. moroides* (Wedd.) Chew, and that *D. cordata* does not occur in Australia. A key to *Dendrocnide* in Australia is provided, together with taxonomic accounts and descriptions of *D. cordata* and *D. moroides*.

Key Words: Urticaceae, *Dendrocnide cordata*; *Dendrocnide cordifolia*; *Dendrocnide moroides*; Papua New Guinea flora; Australia flora; Queensland flora; species description; identification key

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Introduction

Chew (1969) revised *Dendrocnide* Miq. (Urticaceae), enumerating 36 species, including four from Australia. One of these species is *D. cordata* (Warb. ex H.J.P.Winkl.) Chew, typified by a specimen from the northern coast of Papua New Guinea. Chew (1969) cited two specimens of *D. cordata* from Australia (*Smith 10132*; *Volck & Dansie 1470*), both from the Atherton Tableland in northern Queensland. He placed *Laportea cordifolia* L.S.Sm. in the synonymy of *D. cordata,* erroneously citing the taxon name as *L. 'cordatifolia'*. Chew (1989) cited one additional specimen for Australia (*Stocker 1796*), also from the Atherton Tableland, but no other new information on *D. cordata* was given there.

Jackes & Hurley (1997) clearly demonstrated from field observations and glasshouse-grown plants that the Atherton Tableland populations of *Dendrocnide cordata*, including the specimens cited above, differ from the taxa represented by the types of *D. moroides* (Wedd.) Chew and *D. cordata,* but matched the type of *Laportea cordifolia* L.S.Sm. Accordingly, they reinstated and transferred the latter name to *Dendrocnide*, with the name *Dendrocnide cordifolia* (L.S.Sm.) Jackes & M.Hurley applying to the Atherton Tableland taxon.

Jackes & Hurley (1997) then went on to apply the name *Dendrocnide cordata* to a single Australian specimen (*Fell 4155 et al.*), from the Lockhart River area of Cape York Peninsula. They reasoned that this specimen was not *D. moroides* mainly because they could not see any abscission scars for the male flowers, indicating that the inflorescence is wholly female. According to Chew (1969), unisexual inflorescences (with some exceptions) are a feature of *D. cordata* but not of *D. moroides.*

Chew (1969) stated that *Dendrocnide cordata* is closely related to *D. moroides.* He distinguished *D. cordata* by "a. the plant altogether less irritant, b. lamina cordate not peltate, *c.* inflorescence unisexual, rarely bisexual as well", and he characterised *D. moroides* by the inflorescences with "10–20 female flowers around each male", and by the cordate-peltate lamina, with sharply toothed margin.

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From an examination of all the fertile specimens of *Dendrocnide moroides* at BRI, it is apparent that male flowers or their abscission scars are present only on a minority of fertile specimens. Hence, the inflorescences of *D. moroides* are sometimes bisexual but often unisexual, and the presence or absence of bisexual inflorescences is not a reliable character to distinguish *D. moroides* from *D. cordata*.

The protologue for *Laportea cordata* (Winkler 1922) includes the following "leaves broadly cordate, margin undulate denticulate, base 5-nerved". The latter feature was largely ignored by Chew, but does appear to be diagnostic, i.e. leaves 5-veined at base for *Dendrocnide cordata* versus 3-veined at base for *D. moroides*.

Examination of the *Fell 4155* specimen (cited as *Dendrocnide cordata* by Jackes & Hurley (1997)), finds that its leaves are clearly peltate, 3-veined at base and with regularly dentate margins. These are all features of *D. moroides*. In contrast, *D. cordata* has cordate leaves, 5-veined at base and irregularly crenulate leaf margins. The apparent absence of male flowers is not considered an identifying feature for either species. Seven other specimens at BRI, collected from Cape York Peninsula after the Fell specimen and labelled *D. cordata*, are similarly identified as *D. moroides*.

In conclusion, I agree that *Dendrocnide cordifolia* is a distinct species worthy of recognition, and find that the name *D. cordata* has been misapplied to specimens of *D. moroides* from Cape York Peninsula. *D. cordata* does not occur in Australia. A comparison of characters for the three species is provided in **Table 1**.

Taxonomy

Dendrocnide cordata (Warb. ex H.J.P.Winkl.) Chew, *Gard. Bull. Singapore* 21: 202 (1965); *Laportea cordata* Warb. ex H.J.P.Winkl., *Bot. Jahrb. Syst.* 57: 503 (1922). **Type:** Papua New Guinea. MADANG PROVINCE. Constantinhafen [Melamu], in 1887, *K. Hollrung 513* (syn: K 000675706!; MEL 8911!).

Monoecious trees 8–15 metres high. Leaves alternate; petiole 11–34 cm long; lamina very broadly ovate to orbicular, 15–40 cm long, 18–38 cm wide, base cordate, not peltate; venation mostly pinnate, but with 5 prominent palmate veins at the base of the lamina; margins irregularly crenulate; upper surface glabrous, cystoliths circular, abundant; lower surface glabrous except along veins. Inflorescence unisexual. Male flowers 1–1.5 mm long, pedicel up to 1 mm long. Female flowers in clusters, *c.* 1 mm long; stigma ligulate, 0.7–1.2 mm long. Achenes dorsi-ventrally flattened, broadly-ovate in outline, 1.5–2 mm long, with or without a raised medial ridge, surface smooth, lateral tepals very small, much shorter than achene.

***Additional specimens examined*: Papua New Guinea.** EAST SEPIK PROVINCE: Near Kundiman village, Yuat River, Sep 1959, *Pullen 1784* (L). MOROBE PROVINCE: Oomsis Creek, *c.* 18 miles [30 km] W of Lae, Mar 1962, *Hartley 10032* (BRI, L); Mori River, Abau subdistrict, Feb 1969, *Henty & Lelean NGF41847* (BRI, L); Yalu, Jul 1944, *White et al. NGF1662* (BRI, L). MADANG PROVINCE: Camp 2, Guam River, Josephstaal FMA area, Aug 1999, *Takeuchi 13992 et al.* (L). GULF PROVINCE: Purari River, delta area 32.5 km E of Baimuru, Mar 1974, *Croft LAE61082* (BRI).

***Note*:** Several specimens determined by Chew as *Dendrocnide cordata* from Central province (e.g. *Pulsford UPNG107, Carr 11207, White 787 & Darbyshire 629*) and the Tanimbar Islands (*Buwalda 4292 & 4162*) appear to differ markedly from the type, and may represent a new species.

Dendrocnide moroides (Wedd.) Chew, *Gard. Bull. Singapore* 21: 204 (1965); *Laportea moroides* Wedd., *Arch. Mus. Hist. Nat.* 9: 142 (1856); *Urticastrum moroides* (Wedd.) Kuntze, *Revis. Gen. Pl.* 2: 635 (1891). **Type:** [Queensland. COOK DISTRICT:] Endeavour River, *s. dat.*, *A. Cunningham s.n.* (holo: G 00354074!).

Laportea peltata Gaudich. ex Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 490 (1834). **Type:** Timor. [1801–1803], *J.B. Leschenault s.n.* (holo: P 00602034!).

Monoecious shrubs 0.5–5 metres high. Leaves alternate; petiole 7–19 cm long; lamina very broadly ovate to orbicular, 9–18 cm long, 9–16 cm wide, base peltate; venation mostly pinnate, but with 3 prominent palmate veins at the base of the lamina; margins dentate or denticulate; upper surface densely hairy with hairs of differing length, cystoliths circular, abundant; lower surface densely hairy. Inflorescence unisexual or bisexual. Male flowers *c.* 1.5 mm long, pedicel *c.* 1.5 mm long. Female flowers in clusters, *c.* 0.75 mm long; stigma ligulate, 0.8–1.8 mm long. Achenes dorsi-ventrally flattened, ovate in outline, 1.5–2.2 mm long, surface papillose, lateral tepals enlarged and almost covering achene.

***Additional specimens examined* [Cape York Peninsula only]: Queensland.** COOK DISTRICT: West Claudie River, 10.3 km WNW of Lockhart River, Mar 1994, *Fell DGF4155 et al.* (BRI); Orchid Creek Station, SW of Lockhart River, May 2014, *Forster PIF41188 & Thompson* (BRI); 2 km S of 12 mile yards on Munburra, Sep 2012, *Thompson ST12697 et al.* (BRI); Macrossan Range, Turrel Hill, Silver Plains, Jul 1997, *Forster PIF21322 et al.* (BRI); Rocky River scrub, Silver Plains, Jul 1996, *Forster PIF19473* (BRI); 10 km along Battle Camp Road, off Cooktown-Hopevale road, Apr 1999, *Forster PIF24329 & Booth* (BRI); Bakers Blue Mountain, Font Hills, Jun 1996, *Forster PIF19248 et al.* (BRI)]; *c.* 20 km S of Cooktown on Cairns road, Apr 1975, *Craven 3216* (L).

Table 1. Morphological comparison of *Dendrocnide cordata*, *D. cordifolia* and *D. moroides*

Character	*D. cordata*	*D. cordifolia*	*D. moroides*
leaf upper surface	glabrous	sparsely hairy	densely hairy
leaf base	cordate	cordate	peltate
basal leaf vein number	5-veined	3-veined	3-veined
leaf margin	irregularly crenulate	dentate or denticulate	dentate or denticulate
inflorescence sex	unisexual	bisexual	unisexual or bisexual
inflorescence length	5–20 cm	2–6 cm	5–15 cm
tepals (at fruiting stage)	much shorter than achene	almost covering achene	almost covering achene
achene surface	sometimes with a medial raised ridge, otherwise smooth	papillose throughout	papillose throughout

Key to the Australian species of *Dendrocnide*

1 Lower leaf surface glabrous or with hairs only on the veins **2**
1. Lower leaf surface moderately to densely hairy **3**

2 Leaves elliptical to narrowly elliptic, 4–7.5 times longer than wide . . . . **D. corallodesme**
2. Leaves broadly elliptical to ovate, 1.6–2.5 times longer than wide . . . . **D. photiniphylla**

3 Leaves peltate; upper leaf surface with dense indumentum of variable-length hairs . . . . **D. moroides**
3. Leaves cordate; upper leaf surface with sparse indumentum of uniform-length hairs, or glabrous **4**

4 Leaf margins regularly dentate; mature infructescences white . . . . **D. cordifolia**
4. Leaf margins entire or crenulate; mature infructescences purple . . . . **D. excelsa**

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Alangium solomonense (Bloemb.) W.J.de Wilde & Duyfjes (Cornaceae), a new species record for Australia and Queensland

Paul I. Forster

Forster, P.I. (2019). *Alangium solomonense* (Bloemb.) W.J.de Wilde & Duyfjes (Cornaceae), a new species record for Australia and Queensland. ***Austrobaileya* 10(3): 545–547.** The genus *Alangium* Lam. comprises two species in Australia, *viz. A. polyosmoides* (F.Muell.) Baill. (with two subspecies) and the newly recorded *A. solomonense* known from Cape York Peninsula in Queensland. *Alangium solomonense* has been previously referred to under the phrase name *A.* sp. (Claudie River B.P.Hyland 2682RFK) in Australia. A key is provided to the Australian species of *Alangium*.

Key Words: Cornaceae; *Alangium*; *Alangium solomonense*; *A.* sp. (Claudie River B.P.Hyland 2682RFK); Australia flora; Queensland flora; new species record; identification key

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Introduction

The genus *Alangium* Lam. is widespread in Africa, Asia, Malesia, Melanesia and Australia where it occurs south to around Canada Bay in New South Wales. In Australia, a single polymorphic species *A. villosum* (Blume) Wangerin has been long recognised, with two subspecies (*A. villosum* subsp. *polyosmoides* (F.Muell.) Bloemb. and *A. villosum* subsp. *tomentosum* (F.Muell.) Bloemb.) that were considered endemic to Australia (Bloembergen 1939; Hewson 1984). This conservative single species view of the classification of the Australian taxa remained stable for over 40 years, until the recognition of a third taxon (Hyland 1982; Hyland & Whiffin 1993; Hyland *et al.* 1994; Jessup 1997; Cooper & Cooper 2004) with the collection *Hyland 2682RFK* used as the standard for a phrase named entity. The third taxon has been considered to only occur on Cape York Peninsula and was first collected in 1962 by Len Webb and Geoff Tracey, at which time it was identified as *A. villosum* subsp. *polyosmoides* by Lindsay Smith and Tracey. Hewson (1984) stated that *A. villosum* subsp. *polyosmoides* was widespread in eastern Australia, extending to Cape York Peninsula although no specimens were cited from that region.

In the account of *Alangium* section *Rhytidandra* Bloemb. by de Wilde & Duyfjes (2017), the Australian taxa formerly classified under *A. villosum* were reclassified as two subspecies of *A. polyosmoides* (F.Muell.) Baill. While reviewing this classification it became evident that *A.* sp. (Claudie River B.P.Hyland 2682RFK) was synonymous with *A. solomonense* (Bloemb.) de Wilde & Duyfjes, so this is formally dealt with in this short paper, together with notes on its occurrence and habitat in Australia.

Materials and methods

This paper is based on herbarium collections at the Queensland Herbarium (BRI), online images of type specimens and field observations by the author. In the specimen citations National Park is abbreviated as NP.

Taxonomy

Alangium solomonense (Bloemb.) W.J.de Wilde & Duyfjes, *Blumea* 17: 81 (2017); *A. villosum* subsp. *solomonense* Bloemb., *Bull. Jard. Bot. Buitenzorg* Ser. 3, 16: 207 (1939). **Type:** Solomon Islands. Santa Ysabel Island, Sigana, 12 January 1933, *L.J. Brass 3463* (lecto: BO *n.v.*, *fide* de Wilde & Duyfjes 2017: 81; isolecto: A image!; BRI).

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Alangium sp. (=RFK/2682); Hyland (1982); Hyland & Whiffin (1993).

Alangium sp. (Claudie River B.P.Hyland 2682RFK); Hyland *et al.* (1994: 300); Jessup (1997: 13; 2002: 13; 2007: 53; 2010: 48; 2018); Australian Tropical Rainforest Plants (2019).

Alangium sp. (Claudie River); Cooper & Cooper (2004: 13).

***Illustrations*:** Hyland (1982); Hyland & Whiffin (1993); Cooper & Cooper (2004: 13); Australian Tropical Rainforest Plants (2019).

A detailed species description is available online (de Wilde & Duyfjes 2017: 81).

***Additional specimens examined* (Australian occurrence only):** Queensland. Cook District: 1 km SW of King Park Ranger Station, Claudie River, Apr 1992, *Fell DF2506* (BRI; CNS *n.v.*); Claudie River, Oct 1972, *Hyland 2682RFK* (BRI; CNS *n.v.*); *ibid*, Jul 1978, *Hyland 3814RFK* (BRI; CNS *n.v.*); In the middle where Claudie River and Scrubby Creek meet, 6.5 km N of King Park Ranger Station, May 1990, *Fell DF2101* (BRI; CNS *n.v.*); West Claudie River Scrub, Jul 1993, *Forster PIF13559 et al.* (BRI); West Claudie River, 11.4 km WNW of Lockhart River Community, Mar 1994, *Fell DGF4159 & Stanton* (BRI; NSW *n.v.*); Iron Range NP, S of West Claudie River crossing off Iron Range Road, Sep 2008, *Ford 5429 et al.* (BRI; CNS *n.v.*); Rocky River, Oct 1969, *Webb & Tracey 9374* (BRI); McIlwraith Range, NE of Coen, in 1962, *Webb & Tracey 7316* (BRI); Head of Temple Creek, Cape Melville NP 4, May 1994, *Fell DGF4337* (BRI; CNS *n.v.*); 0.34 km N of junction of McIvor Road and road W to Battle Camp Road, on road to Cape Flattery, Nov 1989, *Jessup GJD3042 et al.* (BRI); McIvor River Crossing, N of Cooktown, Oct 1986, *Sankowsky 553 & Sankowsky* (BRI); Mt Webb, NP 203, *c.* 15 km NW of McIvor River mouth, Feb 1992, *Fell DG2474 & Jensen* (BRI; CNS *n.v.*); Mount Webb NP, 15 km NW of the McIvor River mouth, Cape York Peninsula, Dec 1992, *Fell DGF2797* (BRI). Cultivated: Hutton Drive, Tolga (ex Claudie River area), Apr 2004, *Ford AF4301* (BRI); Long Pocket (ex Massy Creek Road), Jan 1965, *Tracey 15244* (BRI); Tolga (ex McIvor River), Jul 1990, *Sankowsky 1104 & Sankowsky* (BRI; DNA *n.v.*).

***Distribution and habitat*:** *Alangium solomonense* occurs in the Solomon Islands, Papua New Guinea (Bougainville only) and Australia where it is restricted to Cape York Peninsula north from Mt Cook at Cooktown to the Claudie River near Iron Range. In Australia the plant is invariably restricted to lowland semi-deciduous mesophyll or notophyll vineforests on substrates derived from basalt, granite or schist, often in alluvial or colluvial situations with seasonal flooding.

***Typification*:** When described by Bloembergen (1939) as *A. villosum* subsp. *solomonense*, no holotype as such was listed, rather two syntype collections by Brass (*3463* and *3082*, both with duplicates at B and L) were listed. The excellent flowering and fruiting collection *Brass 3463* was selected by de Wilde & Duyfjes (2017) as the lectotype for this name. An isolectotype is present at BRI.

Key to the Australian species and subspecies of *Alangium* (largely derived from de Wilde & Duyfjes 2017)

1 Corolla in bud ≤ 8 mm long (Cape York Peninsula from Mt Webb north . . **A. solomonense**
1. Corolla in bud ≥ 9 mm long (Australia, S of Cape York Peninsula) **2**

2 Indumentum comprising trichomes 0.1–0.5 mm long, glabrescent; internodes glabrous . . . .**A. polyosmoides** subsp. **polyosmoides**
2. Indumentum comprising trichomes (0.3–)0.5 mm long, persistent; internodes pubescent hairy . . . . **A. polyosmoides** subsp. **tomentosum**

Acknowledgement

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Contents

Les Pedley (1930–2018)

Mostly about wattles: the publications of Les Pedley
P.I. Forster 291–296

Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 6.
L. Pedley. 297–320

A taxonomic revision of Sapotaceae for mainland Australia
L.W. Jessup 321–382

Charles James Wild (1853–1923), an ardent collector of Queensland bryophytes
A.J. Franks 383–404

A taxonomic revision of *Lagenophora* Cass. (Asteraceae) in Australia
J. Wang & A.R. Bean 405–442

Brachychiton guymeri J.A.Bever., Fensham & P.I.Forst. (Sterculiaceae), a new species from north Queensland
R.J. Fensham, J.A. Beveridge & P.I. Forster 443–457

Three new species of *Corchorus* L. and *Grewia* L. (Sparmanniaceae / Malvaceae subfamily Grewioideae) from northern Australia, an earlier name in *Grewia*, and recircumscription of *Triumfetta kenneallyi* Halford
R.L. Barrett 458–472

Reinstatement of *Ptilotus parviflorus* (Lindl.) F.Muell. (Amaranthaceae)
A.R. Bean 473–479

A re-evaluation of the taxonomic status of the Australian species of *Arthraxon* Beauv. and *Thelepogon* Roth (Poaceae: *Panicoideae*: *Andropogoneae*)
E.J. Thompson. 480–505

The botanical collections of William Hann's Northern Expedition of 1872 to Cape York Peninsula, Queensland
J.L. Dowe & P.I. Taylor 506–538

Rediscovery of the previously Extinct *Marsdenia araujacea* F.Muell. (Apocynaceae)
P.I. Forster 539–540

Dendrocnide cordata (Warb. ex H.J.P.Winkl.) Chew (Urticaceae) is not present in Australia
A.R. Bean 541–544

Alangium solomonense (Bloemb.) W.J.de Wilde & Duyfjes (Cornaceae), a new species record for Australia and Queensland
P.I. Forster 545–547